EXPRESS5800/120Lf

NEC

User's Guide

EXPRESS5800/120Lf

User's Guide

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Using This Guide

The EXPRESS5800/120Lf User's Guide provides a quick reference to information about your system. Its goal is to familiarize you with your system and the tasks necessary for system configuring and upgrading.

This guide contains the following information:

- Chapter 1, **"**System Overview" provides an overview of your system and describes your system's major system components. See this chapter to familiarize yourself with your system.
- Chapter 2, "Setting Up Your System" tells you how to select a site, unpack the system, assemble the rack-mount subsystem, make cable connections, and power on your system.
- Chapter 3, "Configuring Your System" tells you how to configure the system and provides instructions for running the BIOS Setup Utility and the SCSISelect Utility, which is used to configure SCSI devices in your system. This chapter also provides information on system board jumper settings.
- Chapter 4, "Upgrades and Options" provides you with instructions for upgrading your system with an additional processor, optional memory, options cards, peripheral devices, and redundant power supply.
- Chapter 5, "Problem Solving" contains helpful information for solving problems that might occur with your system.
- Appendix A, "Specifications" provides technical specifications for your server unit.
- Appendix B, "Connectors" provides pin information about the external device connectors of your server unit.
- "Glossary" defines the standard acronyms and technical terms used in this manual.
- "Equipment Log" provides you with a sample equipment log for documenting the system configuration and future updates you may make to your system.

Text Conventions

This guide uses the following text conventions.

Warnings, cautions, and notes have the following meanings:

WARNING

Warnings alert you to situations that could result in serious personal injury or loss of life.

CAUTION

Cautions indicate situations that can damage the system hardware or software.

Note: Notes give important information about the material being described.

- Names of keyboard keys are printed as they appear on the keyboard. For example, **Ctrl**, **Alt**, or **Enter**.
- Text or keystrokes that you enter appear as boldface type. For example, type **abc123** and press **ENTER**.
- File names are printed in uppercase letters. For example, AUTOEXEC.BAT.

Related Documents

In addition to this guide, the following system documentation is included with your server either as electronic files on EXPRESSBUILDER or as paper copy shipped with your server.

- *System Release Notes*
  Release Notes provide you with the latest information about your system. This information was not available to be included in your user's guide at the time it was developed and released.
- *Getting Started Sheet*
  The Getting Started Sheet provides several easy-to-follow steps to become familiar with your server documentation and to complete your installation successfully.
- *Network Operating System Configuration Guide*
  This guide contains supplemental instructions needed to install and configure your server Windows 2000, Windows NT 4.0 plus Service Pack 6, Novell NetWare v5.0, and SCO OpenServer Release 5.05 Network Operating Systems. This document is intended to complement the more detailed procedural documents available from the vendor of the network operating system.
- *EXPRESSBUILDER User's Guide*
  The EXPRESSBUILDER User's Guide contains the instructions needed for reloading the operating system (OS) and installing MWA support programs.
- *ServerCare^{SM} Guide*
  The ServerCare Guide contains information about NEC's warranty and server registration.

The following document is included with your server as an electronic file on the ESMPRO Management Suite CD.

- *ESMPRO Management Suite User's Guide*
  The ESMPRO Management Suite User's Guide contains the instructions needed for installing the MWA support programs.

Safety Notices

- **Caution:** To reduce the risk of electric shock which could cause personal injury, follow all safety notices. The symbols shown are used in your documentation and on your equipment to indicate safety hazards.
- **Warning:** Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists.
- **Warning:** The detachable power supply cord is intended to serve as the disconnect device.
- **Warning:** This equipment has a 3-wire, grounded power cord. To prevent electrical hazards, do not remove or defeat the ground prong on the power cord. Replace the power cord if it gets damaged. Contact your dealer for an exact replacement.
- **Warning:** The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

In the U.S.A. and Canada, the power cord must be a UL-listed detachable power cord (in Canada, CSA-certified), type ST or SJT, 16 AWG, 3-conductor, provided with a molded-on NEMA type 5-15 P plug cap at one end and a molded-on cord connector body at the other end. The cord length must not exceed 9 feet (2.7 meters).

Outside the U.S.A. and Canada, the plug must be rated for 250 VAC, 10 amp minimum, and must display an international agency approval marking. The cord must be suitable for use in the end-user country. Consult your dealer or the local electrical authorities if you are unsure of the type of power cord to use in your country. The voltage change occurs via a switch in the power supply.

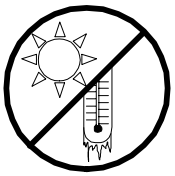
- **Warning:** Under no circumstances should the user attempt to disassemble the power supply. The power supply has no user-replaceable parts. Inside the power supply are hazardous voltages that can cause serious personal injury. A defective power supply must be returned to your dealer.

Safety Notices for Users Outside of the U.S.A. and Canada

- **PELV (Protected Extra-Low Voltage) Integrity:** To ensure the extra-low voltage integrity of the equipment, connect only equipment with mains-protected electrically-compatible circuits to the external ports.
- **Remote Earths:** To prevent electrical shock, connect all local (individual office) computers and computer support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.
- **Earth Bonding:** For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the U.K., those regulations are the IEE.

Care and Handling

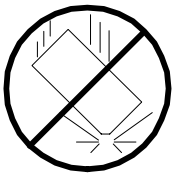
Use the following guidelines to properly handle and care for your system.



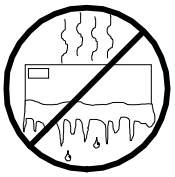
Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.

Keep the system away from magnetic forces.

Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.



Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.

Keep the system away from dust, sand, and dirt.

1

System Overview

- Overview
- System Chassis
- Power Supply
- Peripheral Bays
- SAF-TE Logic
- System Board Features
- Disk Array
- System Functions
- System Security
- Reconfiguration

Overview

This server is a modular, multiprocessing server based on the Intel® Pentium® III microprocessor family. It is a solid performer and offers the latest technology. The combination of compute performance, memory capacity, and integrated I/O provides a high performance environment for many server market applications. These range from large corporations supporting remote offices to small companies looking to obtain basic connectivity capability such as file and print services, e -mail, web access, web site server, etc.

The server is available as a non-redundant non-hot-swap system or as a redundant hot-swap system and is conveniently housed and available as a tower-based system (see Figure 1-1) or as a rack-mount system (see Figure 1-2) that fits into a standard EIA 19-inch rack assembly.

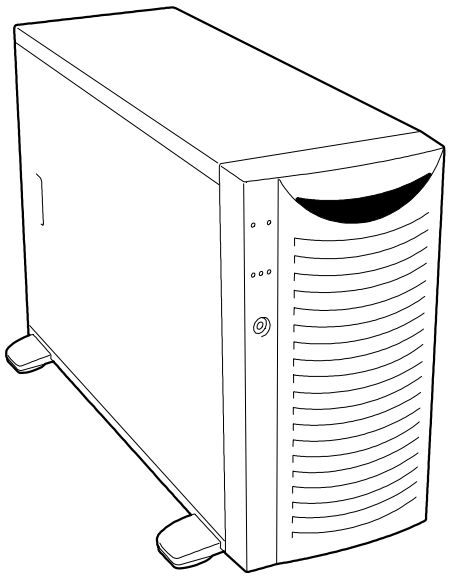


Figure 1-1. Tower-Based System Front View

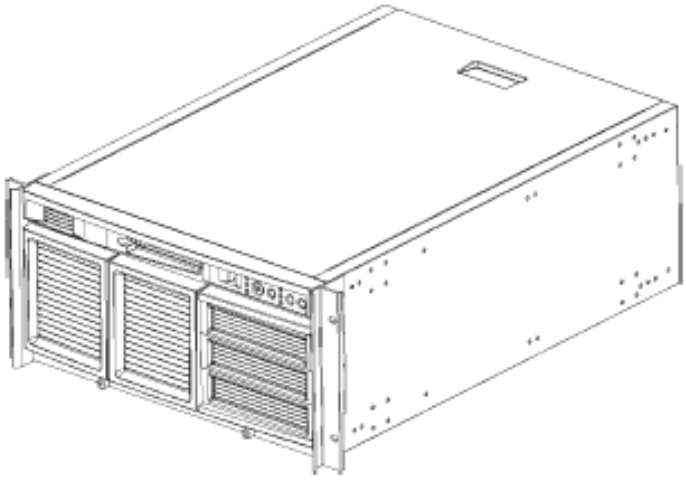
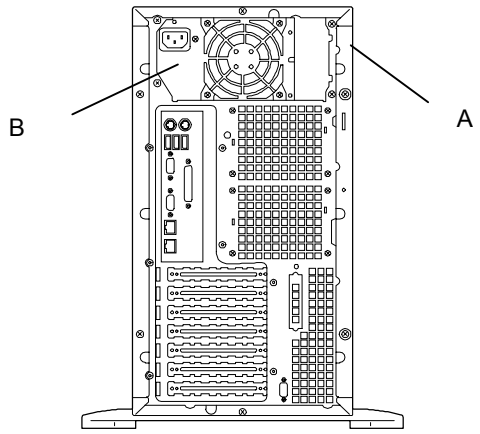


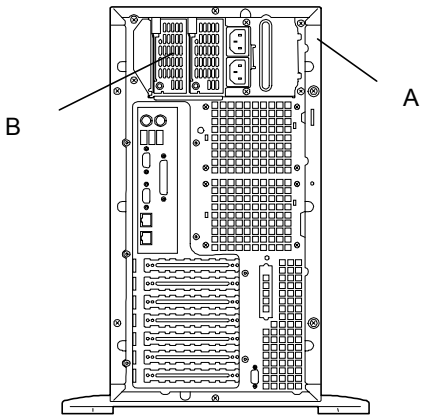
Figure 1-2. Rack-Mount System Front View

Your server may include a non-redundant non-hot-swap power supply or redundant hot-swap power supply module containing up to two power supply units (see Figure 1-3). Your server may also include a non-hot-swap SCSI hard disk drive cage or hot-swap SCSI hard disk drive cage (see Figure 1-4). The non-hot-swap SCSI hard disk drive cage supports five 1-inch SCSI hard disk drives. The hot-swap SCSI hard disk drive cage holds up to five 1.0-inch SCSI hard disk drives that can be swapped in or out of the system without powering it down, if RAID is configured in the system. For hot-swap redundant system models only, an additional five-disk hot-swap hard disk drive cage is also available. This cage comes with five hard disk drive carriers and cables for internal connection.



A System chassis (rear view)
B Non-Redundant Non-Hot-Swap Power Supply

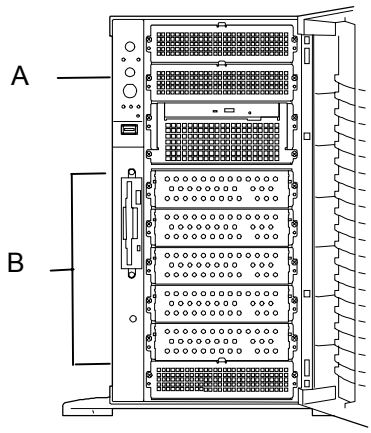
Non-Redundant Non-Hot-Swap Power Supply



A System chassis (rear view)
B Redundant Hot-Swap Power Supply Module

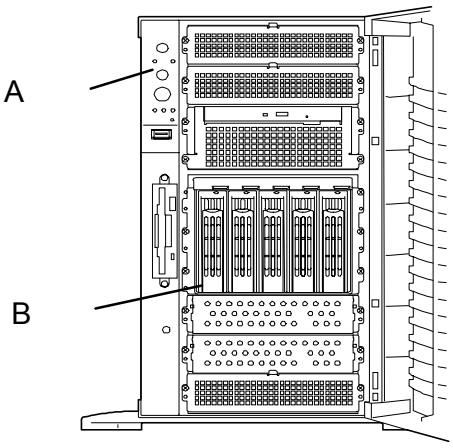
Redundant Hot-Swap Power Supply Module

Figure 1-3. System Power Supply and Power Supply Module



A System chassis (front view)
B Non-Hot-Swap Hard Disk Drive Cage

Non-Hot-Swap Hard Disk Drive Bays



A System chassis (front view)
B Hot-Swap Hard Disk Drive Cage

Hot-Swap Hard Disk Drive Bays

Figure 1-4. SCSI Hard Disk Drive Bays

As application requirements increase, you can expand your server with an additional processor, additional memory, add-in boards and peripheral devices: tape devices, CD-ROM, and hard disk drives.

Non-Redundant Non-Hot Swap System

Your non-redundant non-hot swap system server features the following major components:

- Single or dual high-performance Pentium III processors in a socket-370 FCPGA2 package.
- 256 MB to 6 GB of ECC SDRAM two way interleaved memory, using up to six DIMMs.
- Six PCI expansion slots for add-in boards (four 64 bit/66MHz and two 32 bit/33MHz slots).
- SCSI drive bays accessible from the front of the chassis.
- High degree of SCSI disk fault tolerance and advanced disk array management features through the use of RAID technology, if an optional RAID controller is installed.
- Embedded PC-compatible support (serial, parallel, mouse, keyboard, diskette, USB, LAN, and video).
- Integrated onboard ATI RAGE XL Video Graphics Array (VGA) controller with 4 MB of video memory.
- Adaptec AIC7899W SCSI controller providing dual channel Ultra-160 SCSI interfaces.

- Integrated onboard Network Interface Controller (NIC), a dual Intel 82550 PCI LAN controller for 10 or 100 Mbps Fast Ethernet networks with two RJ-45 Ethernet connectors.
- Dual channel enhanced IDE controller (secondary channel supported only).
- Two 5 ¼-inch removable media expansion bays.
- IDE 24X CD-ROM drive and 3 ½-inch diskette drive.
- Four integrated universal serial bus (USB) ports.
- Hardware monitors (temperature, fans, and voltage) and software monitors to indicate failures.
- Chassis that supports a single power supply for non-redundant non-hot-swap systems.
- Keylocked front cover and two intrusion sensor switches for the front and rear of the chassis.
- Easy access to all parts for service.

Redundant Hot-Swap System

Your redundant hot swap system features the following major components:

- Single or dual high-performance Pentium III processors in a socket-370 FCPGA2 package.
- 256 MB to 6 GB of ECC SDRAM two way interleaved memory, using up to six DIMMs.
- Six PCI expansion slots for add-in boards (four 64 bit/66MHz and two 32 bit/33MHz slots).
- SCSI drive bays accessible from the front of the chassis.
- Hot-swap SCSI disk drive backplane; a failed drive can be removed and replaced with a new drive without system power being turned off (if an optional Redundant Array of Independent Disks (RAID) controller is installed.)
- High degree of SCSI disk fault tolerance and advanced disk array management features through the use of RAID technology, if an optional RAID controller is installed.
- Embedded PC-compatible support (serial, parallel, mouse, keyboard, diskette, USB, LAN, and video).
- Integrated onboard ATI RAGE XL Video Graphics Array (VGA) controller with 4 MB of video memory.
- Adaptec AIC7899W SCSI controller providing dual channel Ultra-160 SCSI interfaces.

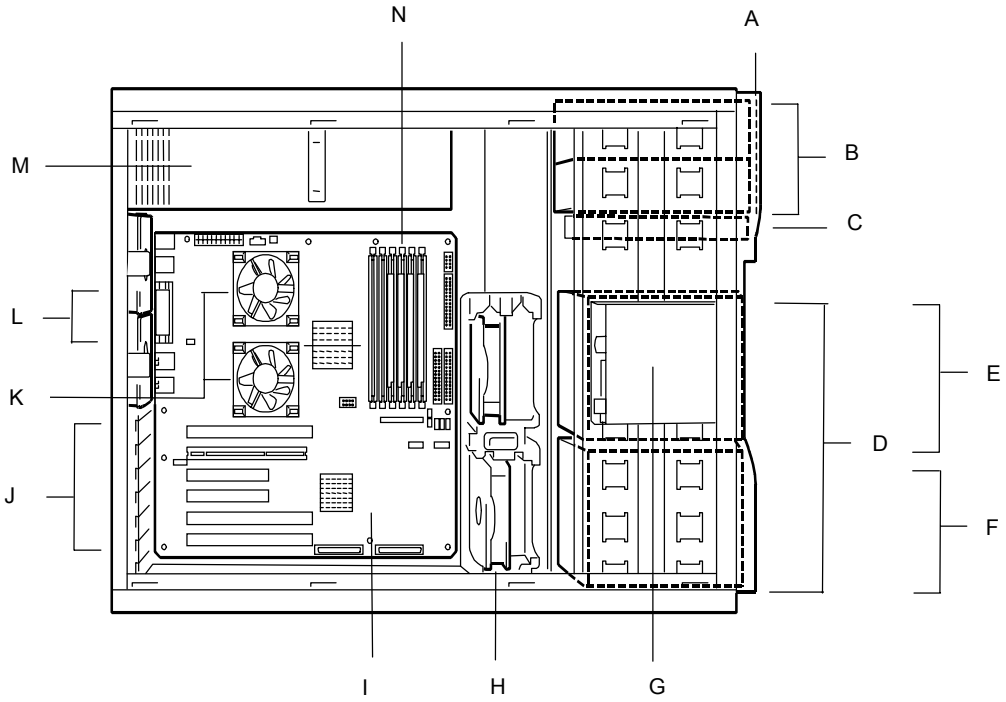
- Integrated onboard Network Interface Controller (NIC), a dual Intel 82550 PCI LAN controller for 10 or 100 Mbps Fast Ethernet networks with two RJ-45 Ethernet connectors.
- Dual channel enhanced IDE controller (secondary channel supported only).
- Two 5 ¼-inch removable media expansion bays.
- IDE 24X CD-ROM drive and 3 ½-inch diskette drive.
- Four integrated Universal Serial Bus (USB) ports.
- Hardware monitors (temperature, fans, and voltage) and software monitors to indicate failures.
- Chassis that supports up to two power supply units. The additional power supply is needed to provide redundant power (i.e., the system will continue to operate with a single power supply failure).
- Self-contained power supply units that are hot swappable and can be easily installed or removed from the back of the chassis without turning the system power off.
- Keylock front cover and two intrusion sensor switches for the front and rear of the chassis.
- Easy access to all parts for service.

Hot-Swap SCSI Hard Disk Drive Bays

- Five hot-swap 1.0-inch SCSI hard disk drive bays accessible from the front of the chassis that allows 3.5-inch SCA LVDS hard disk drives to be swapped in or out of the system without powering it down if RAID is configured in the system.
- High degree of SCSI disk fault tolerance and advanced disk array management features through the use of RAID technology, if an optional RAID controller is installed.
- SCSI backplane is Ultra-160 ready.

System Chassis

The system chassis (Figure 1-5) is an easy-to-expand, fabricated metal structure. The major system components are shown in the following illustrations.



A	Front Panel Board
B	Removable Media Bays (2)
C	IDE 24X CD-ROM Drive
D	Non-Redundant Non-Hot-Swap SCSI Hard Disk Drive Bays (5)
	- OR -
E	Five-Disk Hot-Swap SCSI Hard Disk Drive Cage
F	Optional Five-Disk Hot-Swap SCSI Hard Disk Drive Cage
G	Diskette Drive
H	Front Multi Speed System Input Fans (2)
I	System Board
J	PCI Board Slots (6)
K	Pentium III Processors (2nd Processor is optional)
L	Rear Multi Speed System Exhaust Fans (2)
M	System Power Supply (Non-Redundant Non-Hot-Swap System) or System Power Supply Module (Redundant Hot-Swap System)
N	Memory DIMM Sockets (6)

Figure 1-5. System Chassis

Power Supply

Your server may be configured with one power factor correction (PFC) 300-Watt power supply for non-redundant non-hot-swap systems or two 350-Watt thin power supply units for redundant hot-swap systems.

Each power supply unit has auto-ranging inputs that select 100 – 120 Vac or 200 – 240 Vac at an operating frequency of 50/60 Hz. It is designed to comply with existing emission standards and provides sufficient power for a fully loaded system configuration.

Peripheral Bays

The system supports a variety of standard PC AT-compatible peripheral devices. The chassis includes these peripheral bays:

- A 3.5-inch front panel bay for mounting the standard 3.5" diskette drive (supports 720 KB and 1.44 MB diskette media).
- A front panel bay for mounting the standard 24X (slim) CD-ROM drive.
- Two 5.25-inch removable media front panel bays for mounting half-height 5.25" peripheral devices: optional tape drives, etc.
- Your system may include hot-swap SCSI hard disk drive bays for mounting up to five hot-swap disk drives in easily removable drive carriers. Each drive has a set of two lights to indicate the fault or other status: power-on (green LED), activity (flashing green LED), fault (yellow LED). For mounting additional SCSI hard disk drives an optional five SCSI hard disk drive cage is available

> ***Note:*** The hot-swap SCSI hard disk drive bays contain a hot-swap back plane that require an 80-pin single connector attachment (SCA) connector on the drives that you install.

SAF-TE Logic

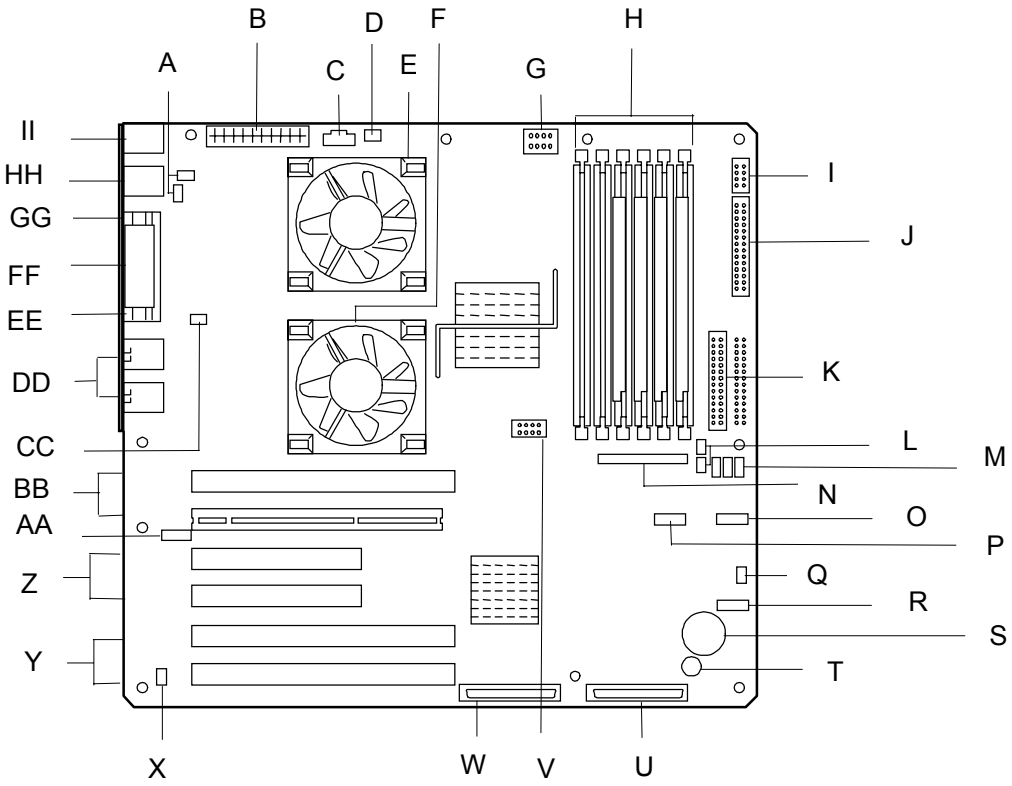
> ***Note:*** SAF-TE Logic is in systems that include the hot-swap SCSI disk drive cage. SAF-TE Logic is not available in systems that include the non-hot-swap hard SCSI disk drive cage.

The SCSI backplane includes SAF-TE (SCSI Accessed Fault Tolerant Enclosure) logic that provides an interface to the disk subsystem that supports status signals, hot swapping drives, and enclosure monitoring.

The transport mechanism for the standardized alert detection and status reporting is the SCSI bus. Disk drives, power supplies, cooling fans, and temperature are continually monitored and the conditions then reported over the SCSI bus to the system. When used with RAID management software the user can be alerted of impending or imminent disk conditions requiring attention. This allows the user to react to conditions that could normally go unnoticed until data loss.

System Board Features

The system board (Figure 1-6) offers a "flat" design with the processor and memory subsystems residing on the board. This figure shows the major components on the system board. The following subsections describe the system board major components.



A	Rear exhaust fan connectors (fan5 and fan6)	S	Lithium backup battery
B	Main power connector	T	Buzzer
C	Auxiliary power connector	U	Media bay or external SCSI connector (SCSI B)
D	CPU1 fan connector	V	Serial COM 2 connector
E	Primary processor connector (CPU1)	W	Internal SCSI HDD bay connector (SCSI A)
F	Secondary processor connector (CPU2)	X	Intrusion switch connector
G	CPU +12 Volt power connector	Y	64 bit, 66MHz PCI slots for add-in boards
H	Memory DIMM slots	Z	32 bit, 33MHz PCI slots for add-in boards
I	USB connector (front panel)	AA	ICMB connector
J	Diskette drive connector	BB	64 bit, 66MHz PCI slots for add-in boards
K	IDE CD-ROM connector	CC	CPU2 fan connector
L	Front intake fan connectors (fan3 and fan4)	DD	LAN RJ-45 network controller connectors
M	Hot swap backplane connectors	EE	VGA monitor port connector
N	Front panel connector	FF	Parallel port connector
O	System configuration jumper block	GG	Serial port connector (COM 1)
P	Processor speed jumper block	HH	Stacked three-port USB connectors
Q	HDD LED connector	II	Dual PS/2 keyboard and mouse connectors (top mouse, bottom keyboard)
R	Configuration jumper block		

Figure 1-6. System Board

Pentium III Processor

Depending on system configuration, each system includes one or two Pentium® III processors. Each Pentium III processor plugs into a standard PGA370 connector. The processor comes with either 256K or 512K cache.

When two processors are installed, both processors must be of identical bus and core speed. When only one processor is installed, the other processor socket must have a terminator card installed.

The processor external interface operates at a maximum of 133 MHz. The second-level cache is located on the substrate of the processor cartridge. The cache includes burst pipelined synchronous static RAM (BSRAM).

System Memory

The system board contains six 168-pin DIMM sockets. Memory is partitioned as three banks of registered SDRAM DIMMs (PC133 compatible) that must be populated in pairs, each providing 72 bits of buffered two-way interleaved memory (64-bit main memory plus ECC). Your system may include from 256 MB to 6 GB of memory, using up to six DIMMs.

System memory begins at address 0 and is continuous (flat addressing) up to the maximum amount of DRAM installed (exception: system memory is noncontiguous in the ranges defined as memory holes using configuration registers). The system supports both base (conventional) and extended memory.

I/O Expansion Slots

The server's expansion capabilities meet the needs of file and application servers for high performance I/O by providing PCI expansion slots.

The system board has four 66 MHz 3.3 V PCI connector slots (Figure 1-7, A and C) that can accommodate 64 bit PCI cards and two 33 MHz 5.0 V PCI connector slots (Figure 1-7, B) that can accommodate 32 bit PCI cards.

PCI features:

- Bus speed up to 66 MHz (Slots 1, 2, 5, and 6), 3.3 V signaling
- Bus speed up to 33 Mhz (Slots 3 and 4), 5.0 V signaling
- 32-bit memory addressing
- Burst transfers up to a peak of 528 MB/s (64 bit, 66 MHz PCI)
- 8-, 16-, 32-, or 64-bit data transfers
- Plug and Play ready
- Parity enabled.

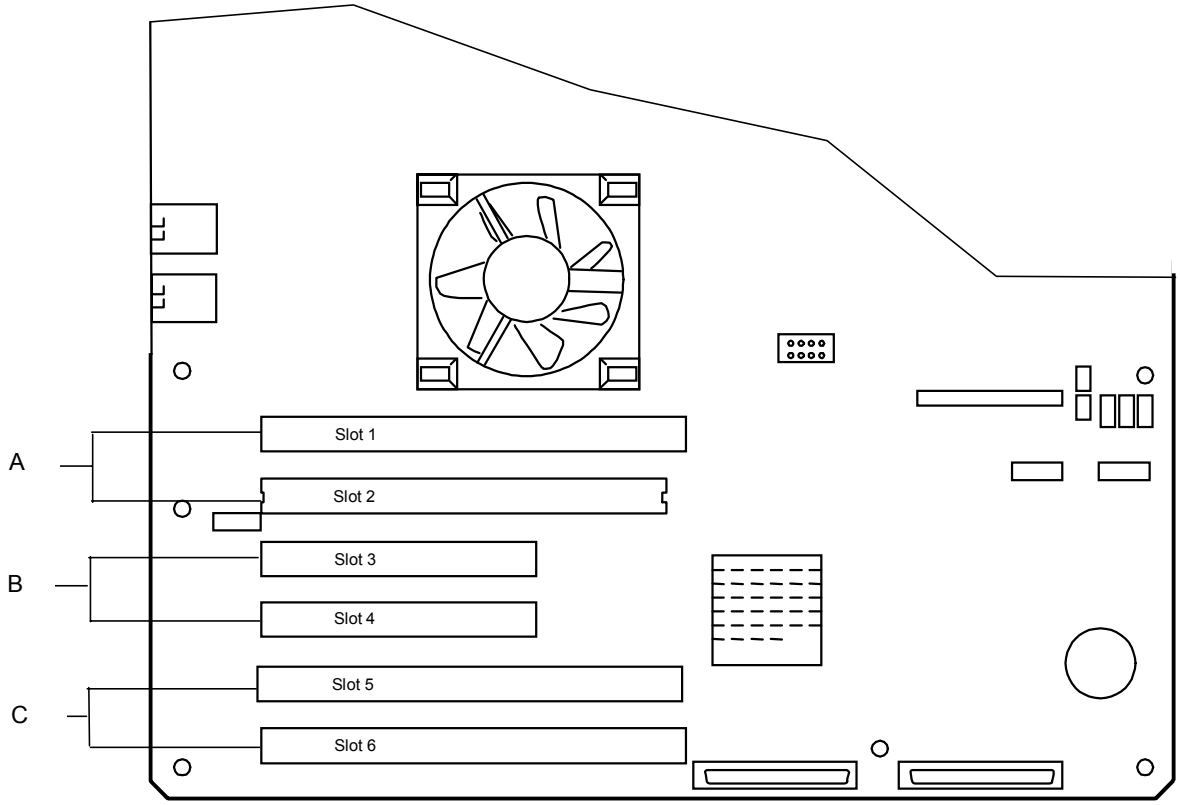


Figure 1-7. PCI Connector Slots

Real-Time Clock/Calendar

The real-time clock provides system clock/calendar information stored in a non-volatile memory (NVRAM). The real-time clock lithium battery provides power backup for the real-time clock.

BIOS

A BIOS and Setup Utility are located in the Flash EPROM on the system board and include support for system setup and legacy device configuration. A number of security, reliability, and management features also have been incorporated to meet vital server needs.

IDE Controller

The system includes a dual channel enhanced IDE 32 bit interface controller for compatible IDE devices. The controller has a connector located on the system board that supports a master and a slave device. The IDE controller provides support for the internally mounted CD-ROM and supports ATA-66 synchronous DMA mode transfers.

The device controls:

- PIO and DMA transfer modes
- Mode 4 timings
- Transfer rates up to 66 MB/s
- Buffering for PCI/IDE burst transfers
- Master/slave IDE mode
- Up to two devices.

Keyboard and Mouse Controller

The keyboard and mouse controller is PS/2 compatible.

Network Controller

The system board includes two 10BASE-T/100BASE-TX network controllers based on the Intel 82550 Fast Ethernet PCI Bus Controller. As a PCI bus master, the controller can burst data at up to 132 MB/sec. The controller contains two receive and transmit FIFO buffers that prevent data overruns or underruns while waiting for access to the PCI bus. The controller has the following:

- 32-bit PCI bus master interface (direct drive of bus), compatible with *PCI Bus Specification, Revision 2.1*
- Chained memory structure with improved dynamic transmit chaining for enhanced performance
- Programmable transmit threshold for improved bus utilization
- Early receive interrupt for concurrent processing of receive data
- On-chip counters for network management
- Autodetect and autoswitching for 10 or 100 Mbps network speeds
- Support for both 10 Mbps and 100 Mbps networks, capable of full or half duplex, with back-to-back transmit at 100 Mbps.
- Support for Wake On LAN.

SCSI Controller

The system board includes an embedded Adaptec AIC7899W dual function SCSI controller. The AIC7899W provides Ultra-160 SCSI interfaces as two independent PCI functions. As implemented on the system board, interface A attaches to an Ultra-160 SCSI backplane that supports up to ten Ultra-160 SCA drives in redundant configuration. Controller B may be used to support SCSI devices in the removable media bays or external to the cabinet.

Video Controller

The system has an integrated ATI Rage XL 64 bit high-performance VGA subsystem that supports the following:

- BIOS compatibility with VGA, EGA, CGA, Hercules Graphics, and MDA
- 4 MB of 10 ns onboard Synchronous Graphics Memory (SGRAM)
- Pixel resolutions up to 1280 X 1024
- Analog VGA monitors (single and multiple frequency, interlaced and noninterlaced) with a maximum vertical retrace noninterlaced frequency of 100 Hz.

Peripheral Controller

The super I/O (PC87417) advanced integrated peripheral controller supports two serial ports (one on rear I/O panel and one 10 pin header connector on the system board), four universal serial ports, one parallel port, diskette drive, PS/2-compatible keyboard and mouse, and integrated Real Time Clock (RTC). The system provides the connector interface for each port.

Serial Ports

Both serial ports are relocatable. Each serial port can be set to one of four different addresses and can be enabled separately. When disabled, serial port interrupts are available to add-in boards.

Parallel Port

One IEEE 1284-compatible 25-pin bidirectional EPP (supporting levels 1.7 and 1.9) parallel port is provided. BIOS programming enables the parallel port and determines the port address and interrupt. ECP mode is supported with 2 possible DMA channels. When disabled, the interrupt is available to add-in boards.

External Device Connectors

The external I/O connectors provide support for a PS/2 compatible mouse and a keyboard, VGA monitor, two serial port connectors, a parallel port connector, two LAN ports, and four USB connections (three on rear I/O panel and one on front panel) for devices other than keyboard or mouse.

System Board Management Controller (BMC)

Server management is concentrated in the System Board Management Controller (BMC). The BMC and associated circuitry are powered from a 5Vdc standby voltage, which remains active when system power is switched off, but the ac power source is still on and connected.

The BMC supports the Management Workstation Application (MWA), which allows remote server management via a modem or direct connection to a manager system. Events monitored by the manager system include over-temperature and over-voltage conditions, fan failure, or chassis intrusion.

Information on the Management Workstation Application (MWA) may be found in Appendix B of this User's Guide.

One major function of the BMC is to autonomously monitor system management events, and log their occurrence in the nonvolatile System Event Log (SEL). The events being monitored include overtemperature and overvoltage conditions, fan failure, or chassis intrusion. To enable accurate monitoring, the BMC maintains the nonvolatile Sensor Data Records (SDRs), from which sensor information can be retrieved. The BMC provides an ISA host interface to SDR sensor information, so that software running on the server can poll and retrieve the server's current status.

The BMC performs the following:

- Monitors server board temperature and voltage
- Monitors processor presence and controls Fault Resilient Boot (FRB)
- Detects and indicates baseboard fan failure
- Manages the SEL interface
- Manages the SDR Repository interface
- Monitors the SDR/SEL timestamp clock
- Monitors the system management watchdog timer
- Monitors the periodic SMI timer
- Monitors the event receiver
- Controls secure mode, including video blanking, diskette write-protect monitoring, and front panel lock/unlock initiation
- Controls Wake On LAN via Magic Packet support.

Disk Array

The optional disk array controller board is a PCI board that improves data reliability. The disk array controller board allows the hard disk drives in the SCSI hard disk drive bays to support disk array configuration RAID levels 0, 1, and 5.

RAID is an acronym of "Redundant Arrays of Independent Disks". It logically integrates several hard disks to appear to the system as only one disk drive.

Using the disk array method, the large-capacity hard disk can be configured with several independent and small-capacity hard disks. It can also enhance the drive by improving the reliability and supporting an automatic rebuilding function.

All RAID levels are common in their basic operation due the fact that several hard disks can be recognized as one disk drive. However, performance, cost, and use are conditions that vary according to the RAID level. You should select an appropriate configuration that is suitable for your system.

Features and selection examples of different RAID levels are shown below.

Level	Definition	Redund-ancy	Feature	Suitable application	Minimum No. of disks
RAID0	Striping	No	Access: high-speed.	Application that needs high performance for non-critical data	2
RAID1	Mirroring (or shadowing)	Yes	Dual disk system. Read mode: high-speed Write mode: slower than RAID 0	Application that needs to store important files on main system drive	2
RAID5	Striped data and parity	Yes	Parity data. Transfers large amount of data. Write mode: slower than RAID 0	Application that needs to store important data. Application of read-intensive type data searching.	3

This unit supports other RAID levels as well. However, it is not recommended to use them unless absolutely necessary.

Automatic Rebuilding Function

The server supports the disk array automatic rebuilding function for data recovery if a hot spare is configured.

> ***Note:*** The automatic rebuilding function supports a disk array configuration of RAID levels, RAID1 or RAID5.

Rebuilding is to regenerate all data from a failed disk to a replacement disk. A rebuild is necessary after a failed disk drive is replaced with a new one.

In disk array configuration RAID levels, RAID1 or RAID5 the failed disk does not affect the operation. However, if another disk error occurs before rebuilding is complete, the data may be destroyed. The array controller will rebuild after the failed disk has been replaced if no hot spare exists.

In a conventional server, the user must select and execute rebuilding using various utilities. This server executes rebuilding automatically provided a hot spare is configured in the array. Since the server also supports hot-swapping function, the failed disk can be replaced while the power is on if no hot spare exists.

Observe the following when using an automatic rebuilding function.

- Do not turn the power off. If power is turned off, automatic rebuilding will not start.
- Use an interval of 60 seconds or more between mounting and dismounting the hard disk drive.
- If a hard disk is being rebuilt, do not replace the hard disk.

Expand Capacity Function

Disk pack capacity can be expanded by adding a disk drive while the system is running. This function is only supported if the server is in the disk array configuration mode.

This function does not utilize operations such as data backup, pack reconfiguration, initialization, restoring the data, or partition expansion.

If a hard disk is added under the operation of the Global Array Manager, perform the following.

- After the hard disk is installed, wait for about 60 seconds and click the Scan Device key. Clicking the Scan Device key after the execution of the expand array operation, will display the added disk correctly.

System Functions

The following subsections describe select system functions.

Hot Swapping

Hot swapping allows a device to be replaced, such as a hard disk drive while its power is on, as listed below.

- Disk array system:
  Any failed hard disk drive can be replaced while the system is running.
- Redundant power system:
  When two power supply units are installed on the redundant power system a failed power supply can be replaced by hot swapping.

Sleep Mode

The SLEEP mode switch on the front of the server is used for saving power.

If the SLEEP mode switch is pressed, then the server enters into the sleep state (the Drive Bay Power lamp and the Power lamp will blink simultaneously). In the power saving mode, the memory data and the states of the jobs are kept unchanged. In addition, the server in the power saving mode can accept accesses to hard disks from other machines on the network and perform other network jobs.

Sleep mode requires an operating system that supports its function.

Note: Windows NT 4.0 does not support the Sleep mode function.

ACPI

An Advanced Configuration and Power Interface (ACPI) aware operating system can place the system into a state where the hard drives spin down, the system fans stop, and all processing is halted. However, in this state the power supply is still on and the processors are still dissipating some power such that the power supply fan and processor fans are still running.

Note: ACPI requires an operating system that supports its feature.

CAUTION

Only when the AC power is disconnected is the system completely off.

The sleep states are defined as follows:

- s0: Normal running state.
- s1: Processor sleep state.
  No context will be lost in this state and the processor caches will maintain coherency.
- s4: Hibernate or Save to Disk.
  The memory and machine state are saved to disk. Pressing the power button or other wakeup event restores the system state from the disk and resumes normal operation. This assumes that no hardware changes have been made to the system while it was off.
- s5: Soft off.
  Only the RTC section of the chipset and the BMC are running in this state.

AC Link Mode

The AC link mode allows the system to monitor its AC input power so that when the AC input power is lost and then restored the system will return itself to one of three pre-selected settings, listed as follows:

- Power On
- Last State (Factory Default Setting)
- Stay Off.

The AC link mode settings can be changed by running the BIOS Setup Utility (F2). Refer to Chapter 3 "Configuring Your System."

Remote Power-On (Wake ON LAN) Function

The remote power-on function turns on the system power by way of a network or modem. If the system power is set to OFF, it can be turned on remotely by sending a specific packet from the main computer to the remote system. This feature can be enabled or disabled using the BIOS Setup Utility. See Chapter 3.

System Security

To help prevent unauthorized entry or use of the system, the system includes a full lockable front panel and Server Management software that monitors the system intrusion switches.

Security with Mechanical Locks and Monitoring

The front panel of the tower-based system contains a mechanical lock and an intrusion switch to prevent access to the front of the computer chassis. The computer chassis includes an intrusion switch on the side cover. When any of these covers are opened, the switch transmits an alarm signal to the system board, where server management software processes the signal.

Security with the rack-mount system is identical to the tower-based system stated above, except that the mechanical locks are on the front and rear doors of the rack cabinet.

Software Locks via the System Setup Utility

The BIOS Setup Utility provides a number of security features to prevent unauthorized or accidental access to the system. Once the security measures are enabled, access to the system is allowed only after the user enters the correct password(s). For example:

- Enable the keyboard lockout timer so that the server requires a password to reactivate the keyboard and mouse after a specified time-out period — 1 to 120minutes.
- Set and enable an administrative password.
- Set and enable a user password
- Set secure mode to prevent keyboard or mouse input and to prevent use of the front panel reset and power switches.
- Disable writing to the diskette drive when secure mode is set.

Reconfiguration

If a CPU or a memory DIMM board error was detected during execution of POST (Power On Self-Test) after system power is turned on, the reconfiguration function isolates the failed CPU or memory DIMM and continues operation. You should replace the failed device as soon as possible.

This function is enabled only when the following system requirements are met:

- Two CPUs are installed.
- Four or six memory DIMMs are installed.

A CPU or memory DIMM error may be viewed on the screen while POST is running or by entering BIOS Setup. It may also be viewed when the ESMPRO Suite program is installed and operating.

2

Setting Up the System

- Overview
- Selecting a Site
- Unpacking the System
- Rack-Mount Subsystem Assembly
- Getting Familiar with the System
- Making Connections
- Connecting the Power Cord
- Using the System

Overview

This chapter describes how to select a site, unpack the system, assemble the rack-mount system unit into a cabinet, make cable connections, and power on the tower-based or rack-mount system units. Information on front and rear panel features, switches and LEDs are also included in this chapter.

Selecting a Site

The system operates reliably in a typical office environment. Choose a site that is:

- Near grounded, three-pronged power outlets.

Note: For the United States and Canada, this means a NEMA 5-15R outlets for 100-120 VAC or NEMA 6-15R outlets for 200-240 VAC. For other international sites, this means three-pronged power outlets applicable for the electrical code of the region.

WARNING

Be sure the power service connection is through a properly grounded outlet.

CAUTION

When two power supplies are installed in the system the power plug from each of the power supplies must be plugged into the same common ground power outlets.

- Clean, dust-free, and well ventilated. Front and rear ventilating openings kept free of obstructions. Away from sources of heat, vibration or physical shock.
- Isolated from strong electromagnetic fields and electrical noise produced by electrical devices (such as air conditioners, large fans, large electric motors, radio and TV transmitters, and high-frequency security devices)
- Spacious enough to provide at least ten inches (25 centimeters) in front of the system, five inches (13 centimeters) behind the system and three inches (eight centimeters) on each side of the system for proper cooling, airflow, and cable clearance.
- Easily accessible for system maintenance and installation of system upgrades.

Unpacking the System

⚠ WARNING

The non-hot-swap system can weigh up to 40 pounds (18 kg) and the hot-swap system can weigh up to 77 pounds (35 kg). If the system contains numerous optional boards and peripheral devices, it will weigh more. To avoid personal injury, make sure you have someone help you lift or move the system.

When you receive your system, inspect the shipping containers prior to unpacking. If the shipping boxes are damaged, note the damage, and if possible, photograph it for reference. After removing the contents of the containers, keep the cartons and the packing materials. If the contents appear damaged when you unpack the boxes, file a damage claim with the carrier immediately.

Rack-Mount Subsystem Assembly

This section provides the instructions for assembling the rack-mount server unit into a standard EIA 19-inch rack cabinet.

Before You Begin

Before you begin, please review the following cautions, warnings, and general guidelines.

⚠ WARNING

Be sure that power to the system is turned off and unplugged. All voltage is removed only when the power cords are unplugged.

- Avoid excessive vibration and shock. Dropping an electronic component can cause serious damage.
- Do not disconnect or remove parts other than those specified in the procedure.
- Do not touch I/O connector pins.
- All screws are Phillips-head, unless otherwise specified.
- On completion of any assembly or reassembly, perform a power-on test. If a fault occurs, verify that the assembly or reassembly was performed correctly. If the problem persists, see "Problem Solving" in Chapter 5.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Preparation

⚠ CAUTION

Ensure that the location of the rack-mount server does not create an unstable condition when installed in the rack cabinet.

Before you begin select an appropriate location in your rack cabinet for the rack-mount server. To improve rack stability, mount heavier items towards the bottom of the rack cabinet. If the rack is a stand-alone unit and the rack is more than 75% filled with components, consider installing an optional stabilizer kit.

Note: When planning your system configuration for the rack cabinet you should consider the length of the cables that interconnect system components.

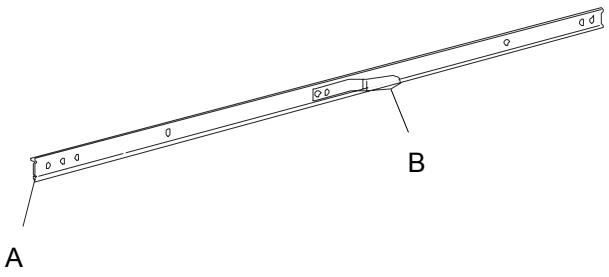
Your server is mounted on a set of slide rail assemblies that allows it to move freely in and out of the system rack. To mount your server in a rack you must attach two center slide rails on each side of the server chassis and then install two rail assemblies in the rack cabinet. The following sections describe how to assemble the rack-mounting hardware and mount the server in a rack cabinet.

Assembly

Your server mounts in the system rack using two slide rail assemblies. Each slide rail assembly has a center slide rail that attaches to the side of the server chassis, as follows.

Note: Perform Step 1 and step 2 on each slide rail assembly if the center slide rails are not factory-installed on your server. If the center slide rails are installed on each side of your server, go to Step 3.

1. Remove the center slide rail (see Figure 2-1) from each slide rail assembly, as follows:
   - Position a slide rail assembly on a flat surface with its center slide rail facing up.
   - Fully extend the telescoping slide rails until they lock in place.
   - While pressing up on the center slide rail safety latch, slide the center slide rail out of the rail assembly and set it aside for installation on the server.



A Center Slide Rail

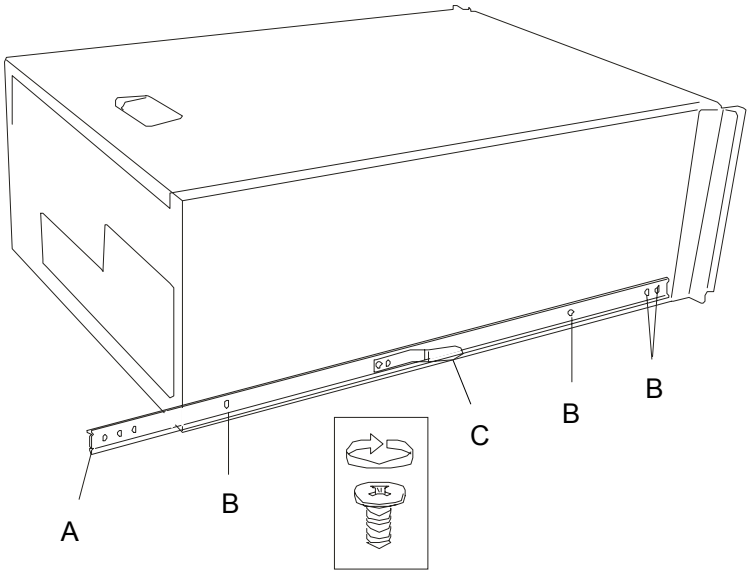
B Safety Latch

Figure 2-1. Center Slide Rail

2. Align the mounting holes in each center slide rail to the threaded holes on the side of the server (see Figure 2-2).

> ***Note:*** The holes in the center slide rails line up to the server chassis only when the safety latch (C) is pointed towards the front of the server.

3. Secure each center slide rail to the server with four screws, as shown in Figure 2-2. Ensure the safety latch (C) is pointed towards the front of the server.



A Center Slide Rail (2)

B Screws (8)

C Safety Latch

Figure 2-2. Attaching the Center Slide Rail to the Server

4. With each slide rail assembly on a flat surface loosen the screws that attach their outer and inner brackets together. Set the slide rail assemblies aside for installation into the rack cabinet.

5. Each slide rail assembly can be separated and adjusted. The distance between its front rack mounting bracket and its rear rack mounting bracket is adjustable to fit between the front and rear vertical rails of the system rack.

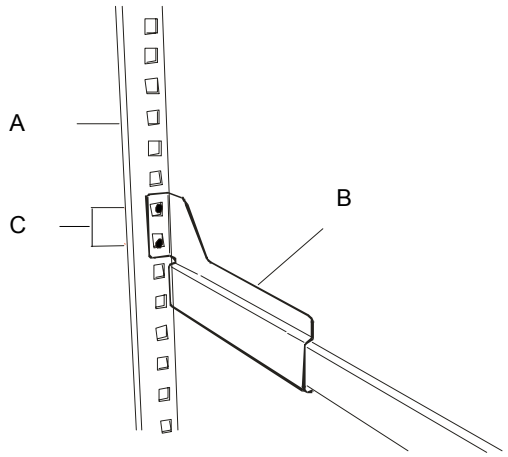
6. Select an appropriate location in the rack cabinet for the rack-mount server. To improve rack stability, mount heavier items towards the bottom of the rack cabinet.

> ***Note:*** When planning the server configuration for the rack cabinet you should consider the length of the cables that interconnect with system components.

Attaching the Rail Assembly Mounting Brackets to the Rack Cabinet

1. Attach the left side front and rear mounting brackets to the rack cabinet using two Phillips flange head screws supplied. See Figure 2-3.

2. Attach the right side front and rear mounting brackets to the rack cabinet using two Phillips flange head screws supplied.



A	Rack
B	Rail assembly
C	Mounting holes

Figure 2-3. Attaching the Mounting Brackets to the Rack Cabinet

3. Adjust and tighten the screws that attach the outer and inner brackets of each slide rail assembly together.

4. Securely tighten all the Phillips screws installed in steps 1 through 2 above.

Installing the Server into the System Rack

This section describes how to install your rack-mount server unit into a standard EIA 19-inch rack cabinet.

⚠ WARNING

The non-hot-swap system can weigh up to 40 pounds (18 kg) and the hot-swap system can weigh up to 77 pounds (35 kg). If the system contains numerous optional boards and peripheral devices, it will weigh more. To avoid personal injury, make sure you have someone help you lift or move the system.

⚠ WARNING

Ensure that the location of the rack-mount server unit does not create an unstable condition when installed in the rack cabinet.

1. Pull the two extension rail assemblies (see Figure 2-4, A) out of each rack mounting assembly on the rack cabinet until they lock in place.
2. With someone assisting you, lift and slide the server into the extended rail slider assemblies.

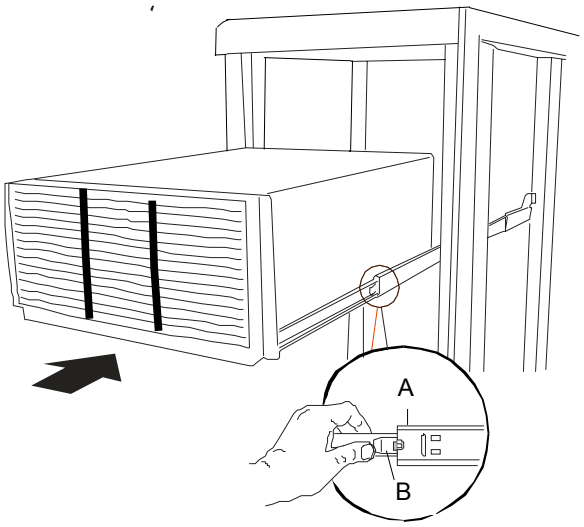
⚠ WARNING

It is strongly recommended that two people are present when lifting and assembling the rack-mount server unit into a rack cabinet.

- Align the server center slide rails with the extended rail assemblies.
- Carefully slide the server into the extended rail assemblies until it stops.
- Carefully press in on the safety latches (Figure 2-4, B) on the center slide bars, ensure that the safety latch on the extension rail assemblies are centered and slide the server towards the rear of the rack cabinet.

Note: When you first slide the server into the rack cabinet, extra pressure may have to be applied. After the first time, the slides will move easier.

3. Check that the server slides in and out of the rack cabinet.
4. Secure the front bezel of the server to the front of the rack cabinet by tightening its thumbscrews.



A Extension rail assembly (2)

B Safety latch (2)

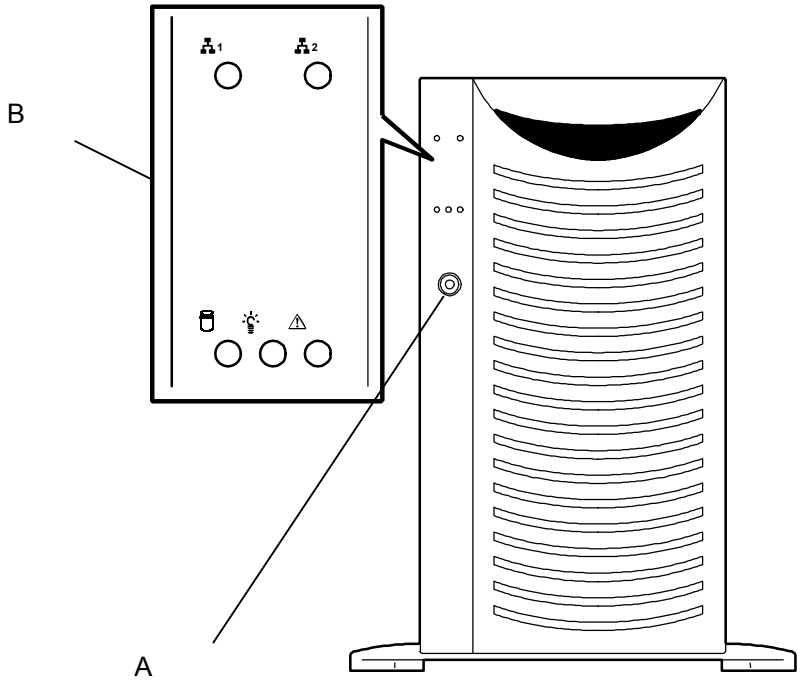
Figure 2-4. Installing the Rack-Mount Server Unit into the Rack Cabinet

Getting Familiar with the System

Before setting up your system, you should become familiar with the system's features, such as the location of your system's front and rear panel switches, indicators and connectors, etc. Note that this section describes the tower-based system controls (switches and indicators) and connectors, which are identical for the rack-mount system except where noted.

Front View with Front Door Closed

Figure 2-5 shows the location of the front system features (tower-based system only).



A	Keylock	When locked, secures the front door not allowing access to the front system controls.
B	System indicators	Refer to Figure 2-7, Figure 2-8, and Figure 2-9 in this chapter.

Figure 2-5. Tower System Front Features

Opening the Front Door

Refer to the Figure 2-6 and open the front door of the cabinet as follows (tower-based system only).

1. If the front door is locked, unlock it.
2. Grasp the indentation located on the top left edge of the front door and pull the door towards you to open it.

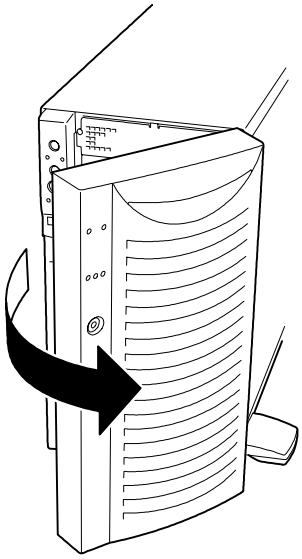


Figure 2-6. Opening the Front Door

Front View (Non-Hot-Swap SCSI Drive Bays)

Figure 2-7 shows the location of the front controls, indicators, and I/O port on a system that includes the non-hot-swap SCSI disk drive bays.

> ***Note:*** For rack-mount systems an additional feature is provided on the front panel consisting of a blue ID LED and ID toggle switch to indicate which particular chassis among several in a rack configuration is being serviced. See *Front View (Rack-Mount Systems Only)* later in this chapter.

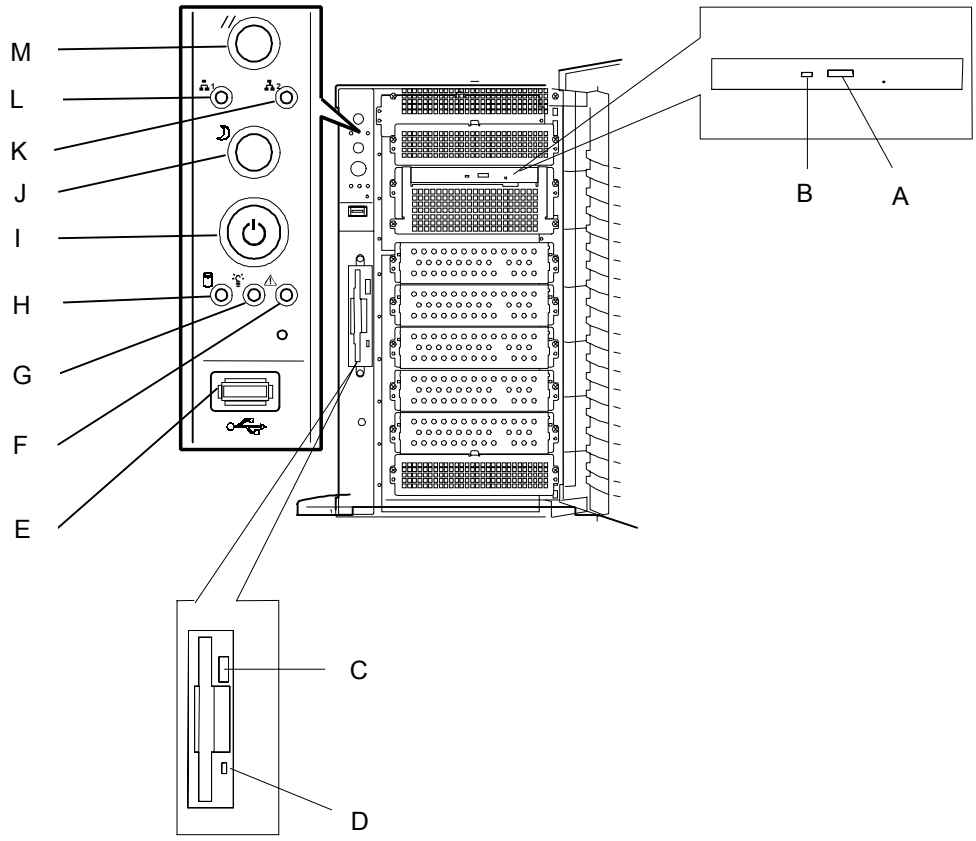


Figure 2-7. Front System Controls, Indicators, and I/O Port (Non-Hot-Swap Bays)

A	Load/eject button, CD-ROM reader	Press to load CD and eject CD.
B	Activity LED, CD-ROM reader	When lit, CD-ROM reader is in use.
C	Eject button, 3 ½-inch diskette drive	Press to eject diskette.
D	Activity LED, 3 ½-inch diskette drive	When lit, diskette is in use.
E	USB port	Front USB connector
F	Status LED	When green, the system is ready. See Table 2-1 for a list and description of the system LEDs.
G	Power/Sleep Status LED	When green, power is present in the system and system is not in Sleep Mode. See Table 2-1 for a list and description of the system LEDs.
H	Hard drive activity	When green, hard drive is active. See Table 2-1 for a list and description of the system LEDs.
I	Power button	Press to turn system DC power on or off.
J	Sleep Button	Press to enter power saving (sleep) mode. Press again to enter normal mode of operation. (This function requires a corresponding operating system.)
K	LAN #2 activity LED	When green, system is linked. See Table 2-1 for a list and description of the system LEDs.
L	LAN #1 activity LED	When green, system is linked. See Table 2-1 for a list and description of the system LEDs.
M	Reset button	Resets the system.

Figure 2-7. Front System Controls, Indicators, and I/O Port (Non-Hot-Swap Bays) (Continued)

Front View (Hot-Swap SCSI Drive Bays)

Figure 2-8 shows the location of the front system controls, indicators, and I/O port on a system that includes the hot-swap SCSI disk drive bays.

> ***Note:*** For rack-mount systems an additional feature is provided on the front panel consisting of a blue ID LED and ID toggle switch to indicate which particular chassis among several in a rack configuration is being serviced. See *Front View (Rack-Mount Systems Only)* later in this chapter.

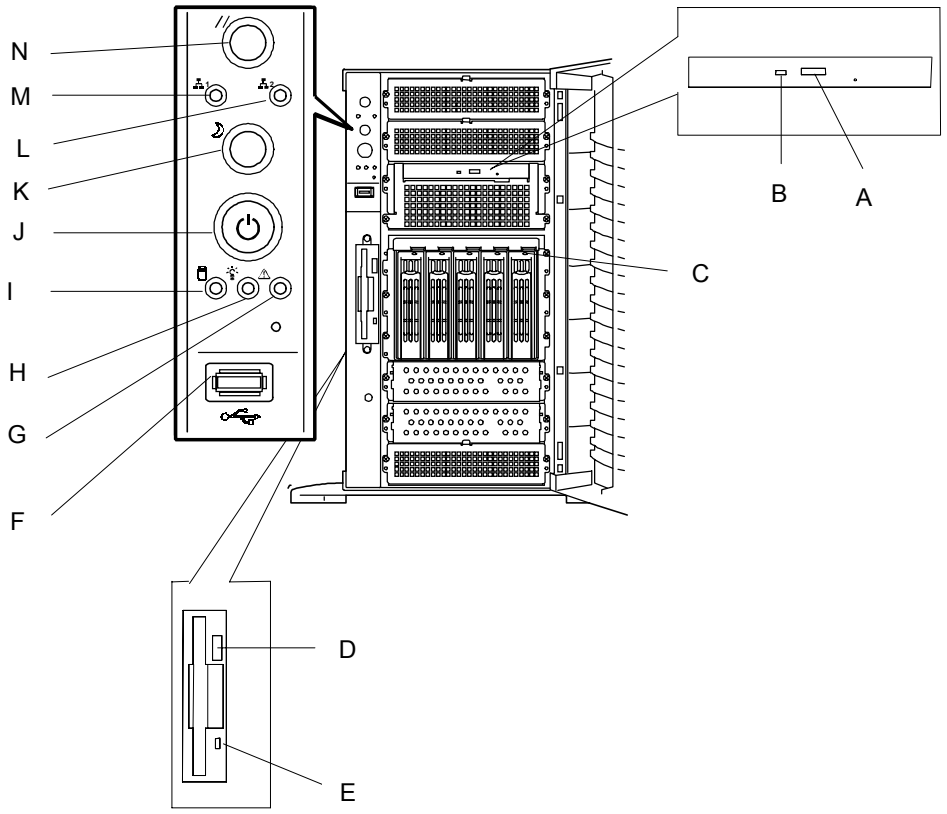


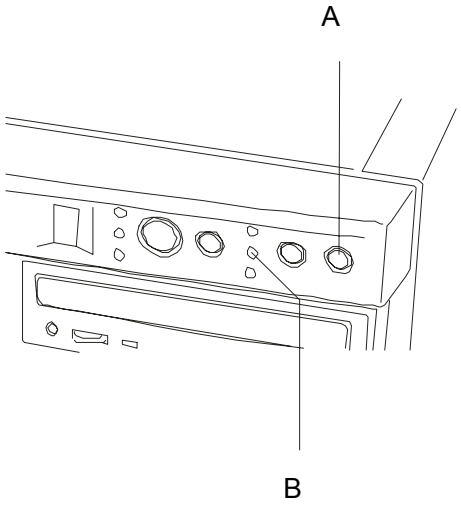
Figure 2-8. Front System Controls, Indicators, and I/O Port (Hot-Swap Bays)

A	Load/eject button, CD-ROM reader	Press to load CD and eject CD.
B	Activity LED, CD-ROM reader	When lit, CD-ROM reader is in use.
C	Activity/Fault LED, SCSI HDD Carrier	When flashing green, there is hard drive activity. When amber, hard drive failure occurred.
D	Eject button, 3 ½-inch diskette drive	Press to eject diskette.
E	Activity LED, 3 ½-inch diskette drive	When lit, diskette is in use.
F	USB port	Front USB connector
G	Status LED	When green, the system is ready. See Table 2-1 for a list and description of the system LEDs.
H	Power/Sleep Status LED	When green, power is present in the system and system is not in Sleep Mode. See Table 2-1 for a list and description of the system LEDs.
I	Hard drive activity	When green, hard drive is active. See Table 2-1 for a list and description of the system LEDs.
J	Power button	Press to turn system DC power on or off.
K	Sleep Button	Press to enter power saving (sleep) mode. Press again to enter normal mode of operation. (This function requires a corresponding operating system.)
L	LAN #2 activity LED	When green, system is linked. See Table 2-1 for a list and description of the system LEDs.
M	LAN #1 activity LED	When green, system is linked. See Table 2-1 for a list and description of the system LEDs.
N	Reset button	Resets the system.

Figure 2-8. Front System Controls, Indicators, and I/O Port (Hot-Swap Bays) (Continued)

Front View (Rack-Mount Systems Only)

Figure 2-9 shows the additional features provided on the front panel of a rack-mounted system that consist of a blue ID LED and ID toggle switch to indicate which particular chassis among several in a rack configuration is being serviced.



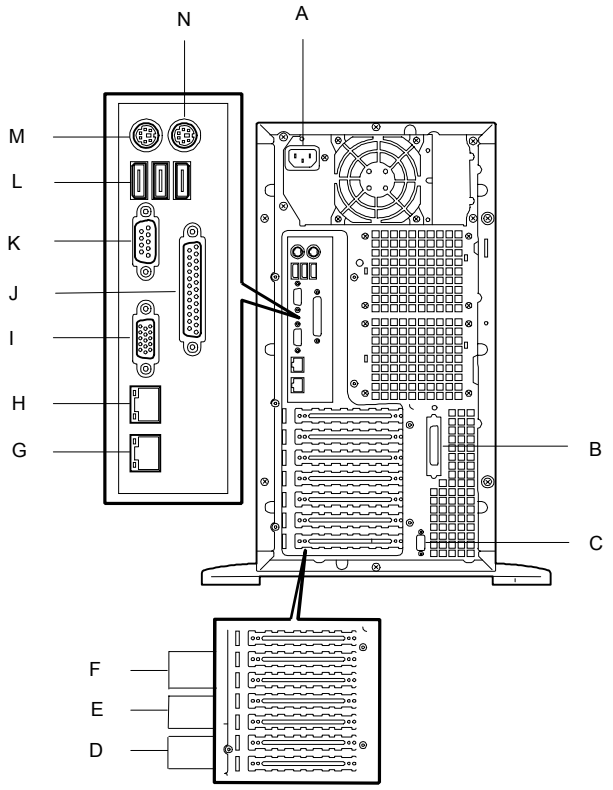
A	ID toggle switch
B	ID LED (blue)

Figure 2-9. Additional Features of the Rack-Mount Front Panel

Rear View

Figure 2-10 shows the location of the system's rear connectors, I/O ports, and indicator.

> ***Note:*** For hot-swap systems in place of the single 300-Watt power supply a power supply module is provided containing up to two 350-Watt power supply units. Each power supply unit contains a power supply status LED indicator. See Table 2-2 for a list and description of the 350-Watt Power Supply Status LED Panel indicator later in this chapter.



A	AC input power connector	Supplies AC power to the power supply
B	Ultra-160 SCSI Connector	Connects to External SCSI Devices
C	Serial Port B	COM2 serial port 9-pin connector (Turquoise)
D	66 MHz, 64-bit PCI Slots	Two 66 MHz, 64-bit PCI add-in board slot locations
E	33 MHz, 32-bit PCI Slots	Two 33 MHz, 32-bit PCI add-in board slot locations
F	66 MHz, 64-bit PCI Slots	Two 66 MHz, 64-bit PCI add-in board slot locations
G	LAN1 connector	RJ-45 Ethernet connector
H	LAN2 connector	RJ-45 Ethernet connector
I	VGA connector	VGA monitor 15-pin connector (Blue)
J	Printer port	Parallel port 25-pin connector (Burgundy)
K	Serial Port A	COM1 serial port 9-pin connector (Turquoise)
L	Stacked USB Ports	USB1, USB2, and USB3 connectors (Black)
M	Keyboard port	PS/2-compatible 6-pin mini-DIN connector (Purple)
N	Mouse port	PS/2-compatible 6-pin mini-DIN connector (Green)

Figure 2-10. Rear Features and Controls

Status LED Indicator Descriptions

Table 2-1 lists the system status LED indicators along with a description of each LED indicator. Table 2-2 lists and describes the 350-Watt power supply status LED panel indicator. Table 2-3 lists system status abnormal conditions. Refer to Figure 2-7, Figure 2-8, and Figure 2-9 for the location of the LED indicators listed in Table 2-1.

The activity LED indicators for the CD-ROM drive and the diskette drive light when access is being made to the media in the drive.

Table 2-1. System Status LED Indicators

LED	Status	Description	Response
Power/Sleep Status	Off	Power OFF or Sleep (S4).	None required (normal)
	Green	Power ON.	None required (normal)
	Flashing Green	Standby/Sleep (S1).	None required (normal)
Status	Green	System ready.	None required (normal)
	Flashing Green	Processor or memory disabled.	Check condition
	Amber	Critical temperature or voltage fault. CPU/terminator missing.	Check condition
	Flashing Amber	Power fault. Fan fault. Non-critical temperature or voltage fault.	Check condition
	Off	Fatal error during POST	Check condition
Hard Drive Activity	Flashing Green	Hard drive activity.	None required (normal)
	Amber	Hard drive failure.	Check disk drive status LEDs[2]
	Off	No activity.	None required (normal)
LAN #1 Activity	Green	Linked	None required (normal)
	Flashing Green	LAN activity.	None required (normal)
	Off	Disconnected.	None required (normal)
LAN #2 Activity	Green	Linked	None required (normal)
	Flashing Green	LAN activity.	None required (normal)
	Off	Disconnected.	None required (normal)
ID LED[1]	Blue	Server identification: Toggled by ID button or software.	None required (normal)
	Off	Server identification: Toggled by ID button or software.	None required (normal)

[1] Rack-Mount System only.
[2] Hot-Swap System only.

Table 2-2. 350-Watt Power Supply Status LED Panel Indicator

LED	Status	Description	Response
STATUS	Off	AC power off to either of the installed power supply units.	Check condition
	Amber	AC power off to this power supply unit only.	Check condition
		Power supply failure (over voltage, over temperature, etc.)	Check condition
		Current limit.	Check condition
	Flashing Green	AC power is present with only standby outputs on.	None required (normal)
	Green	Power supply DC outputs are on and ok.	None required (normal)

Table 2-3. System Status Abnormal Conditions

Status LED	Description	Response
Off	POST is in progress.	Wait for a while. It lights in green a few seconds after completion of POST.
	CPU error is detected.	Turn the server off and then back on. If an error message appears during POST, take note of the error message and contact your technical support representative.
	CPU temperature error is detected. (Thermal-Trip)	Same
	Watchdog timer has timed out.	Same
	Uncorrectable error is detected in the memory.	Same
	PCI system error is detected.	Same
	PCI parity error is detected.	Same
	CPU bus error is detected.	Same
	Memory dump request is being issued.	Wait until the memory dump finishes.
Green (Flashing light)	Memory or CPU is degraded.	Use the BIOS setup utility, SETUP, to locate the degraded device and replace it as soon as possible.
Amber (Steady light)	Temperature error is detected.	Check if any fan inside the server has dust on it. Make sure that fan cables are firmly connected. If the lamp indication still does not change, contact your technical support representative.
	Voltage error is detected.	Contact your technical support representative.
	All power units failed.	Contact your technical support representative.
	Installation error is detected on a CPU, CPU termination board, or PCI board.	Re-install the suspected device.
	Cabinet cover removed.	Re-install the cabinet cover.
Amber (Flashing light)	Redundant power error is detected.	Contact your technical support representative.
	Fan alarm is detected.	Make sure fan cables are firmly connected. If they are and the lamp indication still does not change, contact your technical support representative.
	Temperature alarm is detected.	Check if any fan inside the server has dust on it. Make sure that fan cables are firmly connected. If the lamp indication still does not change, contact your technical support representative.
	Voltage alarm is detected.	Contact your technical support representative.
	Fan module removed.	Check that the fan modules are properly installed.

Making Connections

If your system normally operates without a video display or keyboard (for example, as a network server), you must install a video display and keyboard to configure the system. You may remove them after running the BIOS Setup Utility. For information on running the BIOS Setup Utility, refer to Chapter 3 "Configuring Your System" of this User's Guide.

Refer to the previous figure (Rear Features and Controls) and connect your keyboard, monitor, and mouse. Connect any external peripheral devices such as a printer or modem by following the instructions included with these devices.

⚠ CAUTION

Damage to the system may result if the keyboard/mouse cable is inserted or removed when power is applied to the system.

Inserting a telephone line connector into a RJ-45 LAN port may result in personal injury and equipment damage.

Connecting the Power Cord

Plug the female end of each AC power cord shipped with your system into the input receptacle on the rear of each power supply shipped with your system. Plug the male end of the power cord into NEMA 5-15R outlet for 100-120 VAC or NEMA 6-15R outlet for 200-240 VAC.

If a power cord supplied with the system is not compatible with the AC wall outlet in your region, obtain a suitable power cord that meets the following criteria.

- The power cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.
- The power cord connector that plugs into the wall outlet must be terminated in a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The power cord connector that plugs into the system must be an IEC- type CEE-22 female connector.
- The power cord must be less than 1.8 meters (6.0 feet) long.

When connecting the power cord to a power control unit such as an UPS unit, confirm that the power control unit is powered OFF. Connecting the power cord while power is supplied to the power control unit may cause a failure.

⚠ WARNING

A power cord is provided for each power supply shipped with your system. Do not attempt to modify or use the supplied AC power cord if it is not the exact type required.

Using the System

The following subsections describe how to use this server system properly and safely, including an explanation of the server system power on/off sequences, what the POST program checks in the server, and how to perform a forced power shutdown.

When using the server system the following precautions should be observed.

- Do not delete the hard disk partition exclusively provided for maintenance of the server although it may appear on the operating system (OS). Deleting the hard disk partition may cause malfunction of the server.
- Make sure you power off the server before connecting or disconnecting cables between the server and peripheral devices. Connecting or disconnecting the cables while the server is powered on may cause malfunction or failures within the server.
- Verify that the access lamp on the diskette drive is unlit before turning off the server or ejecting the floppy disk. Turning off the server or ejecting the floppy disk while the access lamp is lit may damage data being stored on the floppy disk.
- After turning off the server, wait at least 40 seconds before turning it on again. Cycling the power immediately may cause malfunction or failures of the server.
- Before relocating the server, turn off the power and unplug the power cord from the outlet. Moving the server when it is powered may cause malfunction or failures of the server.
- Some software includes a command to eject the CD-ROM tray or a media in a device mounted in the 5.25-inch device bay. Make sure that the front door of the tower-based cabinet is open before running the command. Running this command with the front door closed may cause the CD-ROM tray or the media to hit against the front door, resulting in a possible failure of the CD-ROM.
- Clean the server regularly. Regular cleaning prevents failures of the server and its components.
- Lightning may cause a momentary voltage drop. To prevent this problem, an uninterruptible power supply unit is recommended.
- Only use options qualified for the server. A non-qualified option may be mounted or connected to the server, but it may fail to operate normally or even cause failures. These types of failures are not covered under warranty.

Opening the Front Door of the Tower Cabinet

You must open the front door of the tower cabinet to turn the server power on or off, place the server in sleep mode, mount or dismount a floppy disk, mount or dismount a hard disk drive, or mount or dismount 5 1/4-inch removable media devices. See *Opening the Front Door* earlier in this chapter.

> ***Note:*** The standard CD-ROM drive and some options for the 5 1/4-inch devices such as a CD-ROM drive have a function to eject a tray or media using a software command. Before issuing a software command to eject a tray or media, confirm that the front door is open. If the command is executed while the front door is closed a tray or media may run into the front door resulting in an error or may cause the unit to fail.

Powering On Your System

Power on your system as follows.

1. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and the power cords are connected.
2. Power on the video display and any other external devices.

> ***Note:*** If the server power cord(s) is connected to a power control unit such as an UPS (Uninterruptible Power Supply) make sure that the power control unit is powered on.

3. Open the front door (tower-based system only) and press the push-button power on/off switch on the front panel. Verify that the system power-on LED is lit. If it is not lit, ensure the ac power cord is connected to a functional ac power source.

After a few seconds your system begins the internal Power-On Self Tests (POST). POST automatically checks the system board, CPU(s), memory, keyboard, mouse, and most installed peripheral devices. POST also displays the start messages of the BIOS setup utility during execution.

The POST check results should be checked in the following cases:

- When the server is being used for the first time.
- When the server appears to fail.
- When the server beeps many times between power-on and OS start-up.
- When an error message appears on the display unit.

> ***Note:*** For error messages that appear on the display unit, refer to subsection *POST Error Codes and Messages* in Chapter 5 of this Guide.

⚠ CAUTION

Always allow POST to complete before powering down your system.

If you have problems powering on your system, refer to *Problem Solving* in Chapter 5 of this User's Guide.

After you have successfully powered on your system, insert the EXPRESSBUILDER CD-ROM into the CD-ROM device, reboot the system and follow the screen prompts to run EXPRESSBUILDER.

Powering Off the Server System

When server system power is on, pressing the power on/off switch on the front panel of the server turns the power off.

To turn the server system power off:

1. Shutdown the operating system (OS).
2. Press the power on/off switch on the front panel of the server (see Figure 2-7). The power-on LED goes out.
3. Power off the peripheral devices.

Note: If the server power cord is connected to a power control unit such as an UPS (Uninterruptible Power Supply), refer to the UPS user's guide for proper power-off procedures.

Forcing a Power Shutdown

A forced power shutdown can be used when the power on/off switch does not power off the server or the reset functions do not work.

To perform a forced power shutdown:

Press in on the power on/off switch located on the front panel of the server for at least 4 seconds to force the server power off.

To power on after a forced shutdown, wait 10 seconds and then power on again.

3

Configuring Your System

- Configuring Your System
- BIOS Setup Utility
- SCSISelect Utility
- Configuring the RAID Controller
- Configuring System Board Jumpers

Configuring Your System

Configuration and setup utilities are used to change your system configuration. You can configure your system, as well as option boards you may add to your system, using the BIOS Setup Utility. Several unique system parameters are configured using the BIOS Setup, which is stored in the system FLASH memory.

The SCSI*Select* Utility detects the SCSI host adapters on the system board. Use this utility if you need to configure the two SCSI controllers in your system or to perform a SCSI disk format or verify disk operation on the SCSI disk drives. The Adaptec Configuration Utility is also used to configure any SCSI removable media devices installed in your system.

If your system has been factory configured, the BIOS Setup or SCSI*Select* Utility do not need to be run unless you want to change the password or security features, add certain types of option boards or devices, or upgrade your system board.

This chapter also provides information on several system configuration parameters that are set by jumpers on the system board. However, these parameters do not usually require change.

Use the EXPRESSBUILDER CD-ROM to create the device driver diskettes.

BIOS Setup Utility

The BIOS Setup Utility is used to change system configuration parameters. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run.

Using the BIOS Setup Utility

You access the BIOS Setup utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure:

1. Power-on or reboot the system. "Press <F2> to enter SETUP" displays.
2. Press **F2**. The BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections:

Menu	Use
Main	Use this menu for basic system configuration.
Advanced	Use this menu for setting the Advanced Features available on your system.
Security	Use this menu to set User and Supervisor Passwords and the Backup and Virus-Check reminders.
Server	Use this menu for configuring unique Server features.
Boot	Use this menu to configure Boot Device priority.
Exit	Exits the current menu.

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (listed in the table below) to cycle through the allowable values for the selected field. Use the Exit menu's "Save Values" selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press **ENTER**. An arrow precedes selections with submenus.

Refer to the following table for information on the keys that you use with BIOS Setup. These keys are also listed at the bottom of the Setup menu.

Key	Function in Setup Menu
F1 or Alt-H	Get Help about an item.
ESC	Exit the current menu and return to the previous menu.
Left or right arrow keys	Move between menus.
Up or down arrow keys	Move cursor up and down. The cursor moves only to the settings that you can change.
HOME or END	Move cursor to top or bottom of window.
PAGE UP or PAGE DOWN	Move cursor to next or previous page.
F5 or -	Select the previous value for the field.
F6 or + or SPACE	Select the next value for the field.
F9	Load default configuration values for this menu.
F10	Save configuration values and exit.
ENTER	Execute command or Select ➨ submenu.

BIOS Setup Configuration Settings

The BIOS Setup Configurations tables show the default settings for the BIOS Setup Utility and provides a place for you to record any changes you make to these settings. Recommended values are bold in the following tables.

Main Menu

Feature	Choices or Display Only	Description	Your Setting
System Time	HH:MM:SS	Set the System Time.	
System Date	MM/DD/YYYY	Set the System Date.	
Legacy Floppy A	Disabled **1.44/1.25 Mb 3½"** 720Kb 3.5" 2.88MB 3.5"	Hidden if not detected.	
Legacy Floppy B	**Disabled** 1.44 / 1.25 Mb 3½" 720Kb 3.5" 2.88MB 3.5"	Hidden if not detected.	
Hard Disk Pre-delay	**Disabled** 3 seconds 6 seconds 9 seconds 12 seconds 15 seconds 21 seconds 30 seconds	Allows slower spin-up drives to come ready.	
Primary IDE Master	Selects sub-menu		
Primary IDE Slave	Selects sub-menu		
Secondary IDE Master	Selects sub-menu		
Secondary IDE Slave	Selects sub-menu		
Language	**English (US)** French, German Spanish, Italian	Selects which language BIOS displays**. Note:** This feature *immediately* changes to the language BIOS selected.	

Primary and Secondary Master and Slave IDE Submenus

Feature	Choices or Display Only	Description	Your Setting
Type	**Auto** None CDROM User ATAPI Removable IDE Removable Other ATAPI	Selects the type of device attached to the IDE channel. If User is selected, the user will need to enter the parameters of the IDE device (cylinders, head and sectors).	
Cylinders	1 to 2048	Number of cylinders on the drive. This field is only changeable for Type User. This field is informational only, for Type Auto.	
Heads	1 to 16	Number of read/write heads on Drive. This field is only available for Type User. This field is informational only, for Type Auto.	
Sectors	1 to 64	Number of Sectors per Track. This field is only available for Type User. This field is informational only, for Type Auto.	
Maximum Capacity	See description	Computed size of Drive from Cylinders, Heads, and Sectors entered. This field is only available for Type User. This field is informational only, for Type Auto.	
LBA Format Total Sectors	Information Only	Total number of sectors on the drive that are addressable in LBA format.	
LBA Format Maximum Capacity	Information Only	Capacity of the drive while using LBA addressing. This value may be higher than the 'Maximum Capacity' above for drives bigger than 8.4 GB.	
Multi-Sector Transfer	**Disabled** 2 Sectors 4 Sectors 8 Sectors 16 Sectors	Specifies the number of sectors that are transferred per block during multiple sector transfers. This field is informational only, for Type Auto.	
LBA Mode Control	**Disabled** Enabled	Enable/Disable LBA instead of cylinder, head, sector, addressing. This field is informational only, for Type Auto.	

Primary and Secondary Master and Slave IDE Submenus (continued)

Feature	Choices or Display Only	Description	Your Setting
32 Bit I/O	**Disabled** Enabled	Enabling allows 32 bit IDE data transfers.	
Transfer Mode	**Standard** FPIO 1 FPIO 2 FPIO 3 FPIO 4 FPIO 3 / DMA 1 FPIO 4 / DMA 2	Select the method for moving data to/from the drive. This field is informational only, for Type Auto. This field is updated to display only the modes supported by the attached device.	
Ultra Mode	**Disabled** Enabled	Selects the Ultra DMA mode used for moving data to/from the drive. This field is informative only for Type Auto.	

Processor Settings Submenu

Feature	Choices or Display Only	Description	Your Setting
Processor Retest	**No** Yes	If yes, BIOS will clear historical processor status and retest all processors on the next boot.	
Processor Speed Setting	Information Only	Displays measured processor speed.	
Processor 1 CPUID	**CPUID (06XX)** Not Installed Disabled	Reports CPUID for Processor 1, if present. If empty, reports Vacant. If disabled by BMC, reports Disabled.	
Processor 1 L2 Cache Size	Information Only	Displays L2 Cache Size for Processor 1.	
Processor 2 CPUID	CPUID **Not Installed** Disabled	Reports CPUID for Processor 2, if present. If empty, reports Vacant. If disabled by BMC, reports Disabled.	
Processor 2 L2 Cache Size	Information Only	Displays L2 Cache Size for the next Processor.	

Advanced Menu

Feature	Description	Your Setting	Your Setting
Memory Configuration	Select sub-menu.		
PCI Configuration	Select sub-menu.		
I/O Device/peripheral Configuration	Select sub-menu.		
Advanced Chipset Control	Select sub-menu.		
Boot-time Diagnostic Screen	**Disabled** Enabled	If enabled, the BIOS will display the OEM logo during POST. This option is hidden if the BIOS does not detect a valid logo in the flash area reserved for this purpose.	
Reset Configuration Data	**No** Yes	Select 'Yes' if you want to clear the System configuration Data during next boot. Automatically reset to 'No' in next boot.	
Installed O/S	Other **PnP O/S**	If PnP O/S is selected, only the devices required to boot the system are configured. If Other is selected, all devices are configured.	
Numlock	On **Off**	Sets power on Numlock state.	
Memory/Processor Error	**Boot** Halt	Selects the behavior of the system in response to a Memory or Processor reconfiguration. If set to Boot, the system will attempt to boot. If set to Halt, the system will require user intervention to complete booting.	

Memory Configuration Menu

Feature	Choices or Display Only	Description	Your Setting
Memory Group #1 Status	Normal Not Installed Disabled	Displays the current status of the memory bank. Disabled indicates that a DIMM in the bank has failed and the entire bank has been disabled.	
Memory Group #2 Status			
Memory Group #3 Status			
Memory Retest	**No** Yes	Causes BIOS to retest all memory on next boot.	
Extended RAM Step	**Disabled** 1 MB 1 KB Every- Location	Selects the size of step to use during Extended RAM tests.	

PCI Configuration Menu

Feature	Choices or Display Only	Description	Your Setting
Embedded SCSI	Select sub-menu.		
Embedded NIC 1	Select sub-menu.		
Embedded NIC 2	Select sub-menu.		
Embedded Video Controller	Select sub-menu.		
PCI Slot 1	Select sub-menu.		
PCI Slot 2	Select sub-menu.		
PCI Slot 3	Select sub-menu.		
PCI Slot 4	Select sub-menu.		
PCI Slot 5	Select sub-menu.		
PCI Slot 6	Select sub-menu.		

Embedded SCSI, LAN and VGA Submenu

Feature	Choices or Display Only	Description	Your Setting
SCSI Controller LAN Controller 1 LAN Controller 2 VGA Controller	**Enabled** Disabled	If Disabled, the BIOS will hold the embedded chip in reset. In this configuration, the controller hardware is completely disabled and will be invisible to the PnP operating systems.	
Option ROM Scan	**Enabled** Disabled	If Enabled, initialize device expansion ROM.	

PCI Slot Submenu

Feature	Choices or Display Only	Description	Your Setting
Option ROM Scan	**Enabled** Disabled	Enable option ROM scan of the selected device.	

I/O Device/Peripheral Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Serial Port 1	Disabled **Enabled** Auto	If set to “Auto,” BIOS configures the port.	
Base I/O Address	**3F8h** 2F8h 3E8h 2E8h	Selects the base I/O address for serial port 1.	
Interrupt	**4** 3	Selects the IRQ for serial port 1.	
Serial Port 2	Disabled **Enabled** Auto	If set to “Auto”, BIOS configures the port.	
Base I/O Address	3F8h **2F8h** 3E8h 2E8h	Selects the base I/O address for serial port 2.	
Interrupt	4 **3**	Selects the IRQ for serial port 2.	
Parallel Port	Disabled **Enabled** Auto	If set to “Auto,” BIOS configures the port.	
Mode	Output only Bi-Directional EPP **ECP**	Selects Parallel Port Mode.	
Base I/O Address	**378h** 278h	Selects the base I/O address for LPT port.	
Interrupt	5 **7**	Selects the IRQ for LPT port.	
DMA channel	**1** 3	Selects the DMA for LPT port.	
Legacy USB support	Disabled **Enabled**	If disabled, legacy USB support is turned off at the end of the BIOS POST.	
Mouse Port	Disabled **Enabled**	If disabled, PS/2 Mouse Port will not function. Should make IRQ12 available for other devices.	

Advanced Chipset Control Submenu

Feature	Choices or Display Only	Description	Your Setting
PCI Device	Selects sub-menu		
Wake On LAN	**Enabled** Disabled	Only controls legacy wake up. May not be present if not supported.	
Wake On Ring	**Enabled** Disabled	Only controls legacy wake up. May not be present if not supported.	
Sleep Button	**Present** Absent	Present if server supports a separate Sleep button and Power button.	

PCI Device Submenu

Feature	Choices or Display Only	Description	Your Setting
PCI IRQ line 1	Disable **Auto Select**	Select the IRQ for PCI IRQ	
PCI IRQ line 15	IRQ3 IRQ4 IRQ5 IRQ7 IRQ9 IRQ10 IRQ11 IRQ14 IRQ15		

Security Menu

> ***Note:*** Enabling the Supervisor Password field requires a password for entering Setup. The passwords are not case sensitive.

Feature	Choices or Display Only	Description	Your Setting
User Password is	**Clear** Set	Status only, user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in this Chapter).	
Administrator Password is	**Clear** Set	Status only, user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see System Board Jumpers in this Chapter).	
Set User Password	Press **ENTER**	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (refer to System Board Jumpers in this chapter).	
Set Supervisor Password	Press **ENTER**	Supervisor password controls access to the setup utility. When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (refer to System Board Jumpers in this chapter).	
Password on Boot	**Disabled** Enabled	Disables or enables password entry on boot.	
Fixed disk boot sector	**Normal** Write protect	Will write protect the boot sector of the hard drive to prevent viruses from corrupting the drive under DOS if set to write protect.	
Secure Mode Timer	2 minutes 5 minutes 10 minutes 20 minutes 1 hour **2 hours**	Period of key/PS/2 mouse inactivity specified for Secure Mode to activate. A password is required for Secure Mode to function. Has no effect unless at least one password is enabled.	
Secure Mode Hot Key (Ctrl-Alt-)	[ ], [A, B, ..., Z], [0-9]	Key assigned to invoke the secure mode feature. Cannot be enabled unless at least one password is enabled. Can be disabled by entering a new key followed by a backspace or by entering delete.	

Security Menu (continued)

Feature	Choices or Display Only	Description	Your Setting
Secure Mode Boot	**Disabled** Enabled	System boots in Secure Mode. The user must enter a password to unlock the system. Cannot be enabled unless at least one password is enabled.	
Video Blanking	**Disabled** Enabled	Blank video when Secure mode is activated. A password is required to unlock the system. This cannot be enabled unless at least one password is enabled. This option is only present if the system includes an embedded video controller.	
Floppy Write Protect	**Disabled** Enabled	When Secure mode is activated, the floppy drive is write protected. A password is required to re-enable floppy writes. Cannot be enabled unless at least one password is enabled.	
Power Switch Inhibit	**Disabled** Enabled	Determines if power switch functions from front panel.	

Server Menu

Feature	Choices or Display Only	Description	Your Setting
System Management	Selects sub-menu.		
Console Redirection	Selects sub-menu.		
Service Partition Type	1 to 255	Displays the partition type of the Service Partition; the default is 12h.	
Clear Event Log	Enter	If selected, the System Event log will be cleared immediately.	
Assert NMI on PERR	**Disabled** Enabled	If enabled, PCI bus parity error (PERR) is enabled and is routed to NMI.	
Assert NMI on SERR	**Disabled** Enabled	If enabled, PCI bus system error (SERR) is enabled and is routed to NMI.	
FRB-2 Policy	FRB2 Disable **Disable Immediately** Never Disable Allow 3 Failures	Controls the policy of the FRB-2 timeout. This option determines when the Boot Strap Processor (BSP) should be disabled if FRB-2 error occurs. Determines when FRB2 stops.	
Boot Monitoring	**Disabled** Enabled	Enable or Disable the Boot Monitoring Feature	
Thermal Sensor	**Disabled** Enabled	Determines whether the temperature sensor monitoring function is enabled or disabled.	
BMC IRQ	**IRQ11** IRQ5 IRQ10 Disabled	Indicates the IRQ of the BMC interrupt.	
Post Error Pause	**Disabled** Enabled	If enabled, the boot is stopped when Post error occurs.	
AC Link	Power On **Last State** Stay off	Selects system power state after AC loss.	

System Management Submenu

Feature	Choices or Display Only	Description	Your Setting
BIOS Version		Information field only	
Board Part Number		Information field only	
Board Serial Number		Information field only	
System Part Number		Information field only	
System Serial Number		Information field only	
Chassis Part Number		Information field only	
Chassis Serial Number		Information field only	
BMC Device ID		Information field only	
BMC Device Revision		Information field only.	
BMC Firmware Revision		Information field only.	
BMC Firmware BootBlock Revision		Information field only.	
BMC Support IPMI Version		Information field only.	
SDR Revision		Information field only.	
PIA Revision		Information field only.	
Primary HSBP Revision		Information field only, hidden if not detected	
Secondary HSBP Revision		Information field only, hidden if not detected	

Console Redirection Submenu

Feature	Choices or Display Only	Description	Your Setting
Serial Port Address	**Disabled** On-board COM A On-board COM B	When enabled, Console Redirection uses the I/O port specified. Choosing Disabled completely disables Console Redirection.	
Interrupt	3 4	When Console Redirection is enabled, this shows the IRQ assigned per the COM Port Address chosen above.	
Base I/O Address	3F8 2F8	When Console Redirection is enabled, this shows the base I/O address assigned per the COM Port address chosen above.	
Baud Rate	**9600** 19.2 KB 38.4 KB 57.6 KB 115.2 KB	When Console Redirection is enabled, use the baud rate specified. When EMP is sharing the COM port as console redirection, the baud rate must be set to 19.2 KB to match EMP baud rate, unless auto-baud feature is used.	
Flow Control	None CTS/RTS XON/XOFF **CTS/RTS + CD**	None = No flow control. CTS/RTS = Hardware based flow control. XON/XOFF = Software flow control. CTS/RTS +CD = Hardware based + Carrier Detect flow control. When EMP is sharing the COM port as console redirection, the flow control must be set to CTS/RTS or CTS/RTS+CD depending on whether a modem is used.	

Boot Menu

Devices
Removable Devices
Legacy Floppy Drives
Hard Drives
Bootable Add-in Cards
AIC-7899, A:00 <Hard Disk Information>
INTEL Boot Agent Version X.X.XX
INTEL Boot Agent Version X.X.XX

Boot Device Priority Menu

Boot Priority	Device	Description	Your Setting
1.	Diskette Drive	Attempts to boot from a diskette drive.	
2.	ATAPI CD-ROM Drive	Attempts to boot from an ATAPI CD-ROM drive.	
3.	Hard Drive	Attempts to boot from a hard drive device.	
4.	SCSI CD-ROM Drive	Attempt to boot from a SCSI CD-ROM containing bootable media. This entry will appear if there is a bootable CDROM that is controlled by a BIOS Boot Specification compliant SCSI option ROM.	
5.	PXE UNDI	Attempt to boot from a network. This entry will appear if there is a network device in the system that is controlled by a PXE compliant option ROM.	

Hard Drive Selections

Boot Priority	Device	Description	Your Setting
Drive #1 (or actual drive string) Other bootable cards Additional entries for each drive that has a PnP header	To select the boot drive, use the up and down arrows to highlight a device, then press the plus key (+) to move it to the top of the list or the minus key (–) to move it down.	Other bootable cards cover all the boot devices that are not reported to the system BIOS through BIOS Boot specification mechanism. It may or may not be bootable, and may not correspond to any device. Press ESC to exit this menu.	

Removable Drive Selections

Boot Priority	Device	Description	Your Setting
Lists Bootable Removable Devices in the System	+ –	Use +/– keys to place the removable devices in the boot order you want. Includes Legacy 1.44 MB floppy, 2.88 MB floppy etc.	

Exit Menu

You can make the following selections on the Exit Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option. Pressing <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Choices	Description
Exit Saving Changes	Exit after writing all modified Setup item values to NVRAM.
Exit Discarding Changes	Exit leaving NVRAM unmodified. User is prompted if any of the setup fields were modified.
Load Setup Defaults	Load default values for all SETUP items.
Load Custom Defaults	Load values of all Setup items from previously saved Custom Defaults. NOTE: This is hidden if custom defaults are not valid or present.
Save Custom Defaults	Stores Custom Defaults in NVRAM.
Discard Changes	Read previous values of all Setup items from NVRAM.
Save Changes	Write all Setup item values to NVRAM.

SCSI*Select Utility*

The SCSI*Select* Utility detects and configures the SCSI controller located on the system board or an optional SCSI controller board installed in your system. This utility may be started with a simple key operation while POST is in progress and requires no specific start-up disk.

The SCSI*Select* Utility is used mainly to set the transfer rate of connected SCSI device. Use the SCSI*Select* Utility to:

- Change default values
- Check and/or change SCSI device settings that may conflict with those of other devices in the server.

Running the SCSI*Select Utility*

You access the SCSI*Select* Utility when you turn on or reboot your system.

To run the utility, perform the following procedure:

1. Power-on or reboot the system.
2. When this message appears on the video monitor:

   Press Ctrl-A to run SCSI Utility...

3. Press **Ctrl+A** to run this utility. The SCSI utility starts. When the Adaptec SCSI Utility detects more than one AIC-78xx host adapter, it displays a selection menu listing the bus and device number of each adapter. When the selection menu appears, select the channel you wish to configure as follows:

Bus : Device : Channel	Selected SCSI Adapter
02 : 04 : A*	AIC7899
02 : 04 : B	AIC7899

*Internal SCSI connector.

4. Once you select the adapter, the following screen is displayed:

Menu	Description
Configure/View Host Adapter Settings	Configure host adapter and device settings.
SCSI Disk Utilities	The utility scans the SCSI bus for SCSI devices, reports a description of each device. Run these utilities *before* configuring SCSI devices.

5. If you wish to format a disk, verify disk media, or display a list of devices and their SCSI IDs, select “SCSI Disk Utilities”. If you wish to configure the adapter or a device, select “Configure/View Host Adapter Settings”.

Adaptec SCSI Utility Configuration Settings

The following keys are active for all Adaptec SCSI Utility screens:

Key	Action
Arrows	Up and down arrows move from one parameter to another within a screen.
ENTER	Displays options for a configurable parameter. Selects an option.
ESC	Moves back to previous screen or parameter or EXIT if at the Main menu.
F5	Switches between color and monochrome.
F6	Resets to host adapter defaults.

The following table shows the normal settings for the Adaptec SCSI Utility and provides a place for you to record any changes you make to these settings.

Table 3-1.* SCSI*Select Utility Setup Configurations

OPTION	RECOMMENDED SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
SCSI Bus Interface Definitions		
Host Adapter SCSI ID	7	
SCSI Parity Checking	Enabled	
Host Adapter SCSI Termination	Enabled	
Additional Options		
Boot Device Options	Press ENTER for menu	
Boot Channel	A First	
Boot SCSI ID	0	
Boot LUN Number	0	
SCSI Device Configuration	Press ENTER for menu	
Sync Transfer Rate (MB/Sec)	160	
Initiate Wide Negotiation	Yes	
Enable Disconnection	Yes	
Send Start Unit Command	Yes	
Enable Write Back Cache	N/C	
BIOS Multiple LUN Support	No [1]	
Include in BIOS Scan	Yes [1]	
Advanced Configuration Options	Press ENTER for menu.	
Plug and Play SCAM Support	Disabled	
Reset SCSI Bus at IC Initialization	Enabled	

[1] No effect if BIOS is disabled.

Table 3-1. **SCSI***Select Utility Setup Configurations (continued)*

OPTION	RECOMMENDED SETTING OR DISPLAY ONLY	YOUR CONFIGURATION
Display <Ctrl-A> Messages During BIOS Initialization	Enabled	
Extended BIOS Translation for DOS Drives >1 GByte	Enabled	
Verbose/Silent Mode	Verbose	
Host Adapter BIOS (Configuration Utility Reserves BIOS Space)	Enabled[1]	
Domain Validation	Enabled	
Support Removable Disks Under BIOS as Fixed Disks	Disabled[1, 2]	
BIOS Support for Int13 Extensions	Enabled[1]	

[1] No effect if BIOS is disabled.
[2] Do not remove media from a removable media drive if it is under BIOS control.

Exiting Adaptec SCSI Utility

To exit the Adaptec SCSI Utility, press ESC until a message prompts you to exit (if you changed any settings, you are prompted to save the changes before you exit).

Configuring the RAID Controller

The RAID (Redundant Array of Independent Devices) options available for your system are the SecuRAID 112 (Mylex AcceleRAID 160) and the SecuRAID 320 (Mylex AcceleRAID 352) each of which gives your system the added security of high availability, provided an appropriate RAID level is chosen.

If you order a system with a RAID controller, the system is pre-configured at the factory according to Table 3-2 below.

Table 3-2. RAID Configurations

Number of Hard Drives	RAID Level Configured	Hard Drives in Array	Description
1	7	1	**JBOD (RAID 7)** Known as *Just a Bunch of Drives*, JBOD allows the controller to access the drives independently. This configuration has no redundancy and does not use striping.
2	1	2	**Mirroring (RAID 1)** Drives are paired and mirrored. All data is 100% duplicated on an equivalent drive (fully redundant).
3	5	3	**Striping with Parity (RAID 5)** Data is striped across several physical drives. Parity protection is used for data redundancy.
4 or more	5	4 (one standby drive)	**Striping with Parity (RAID 5) with a standby drive** The array consists of three ON-LINE drives and one STANDBY drive. The standby replacement drive, or hot spare, is one of the most important features RAID provides to achieve automatic, non-stop service with a high degree of fault-tolerance.

If you want to change the RAID level or add additional hard disks to the array, use the RAID configuration utility. The RAID configuration utility is included with the RAID controller.

If you are adding the RAID controller to an existing system, the RAID configuration utility allows you to configure your disk array before reinstalling your network operating system. The RAID controllers support various versions of RAID technology (referred to as RAID levels). To use any RAID level, you must configure the RAID controller using the RAID configuration utility prior to installing your Network Operating System. For an explanation of this utility, refer to the documentation on the MYLEX CDROM that was shipped with the RAID controller. It describes RAID technology and provides tips on making your array perform well in your specific application. It also covers array hardware preparation, configuration, and initialization. After completing the steps in the manual, you can install your Network Operating System.

If you want to remotely configure the array (from a PC client); increase array capacity online; or monitor statistics on disk and controller activity, you must install the array manager provided with your RAID subsystem. Increasing array capacity is covered in the user's guide shipped with the option.

Configuring System Board Jumpers

Before You Begin

Only a qualified technical person should perform the procedures in this section.

⚠ CAUTION

Electrostatic discharge (ESD) can damage the system board. Modify the system board only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

The system board jumpers enable you to set specific operating parameters for your system. A jumper is a small plastic-encased conductor (shorting plug) that slips over two jumper pins.

Figure 3-1 shows the location of system board jumpers. Referring to Figure 3-1, jumper A is the password/CMOS configuration jumper. Table 3-3 lists the factory default settings for the password/CMOS configuration jumper. Jumper B shown in Figure 3-1 configures the CPU speed. This jumper must be set to reflect the CPU processor(s) installed in your system. Table 3-4 lists the default settings for jumper B.

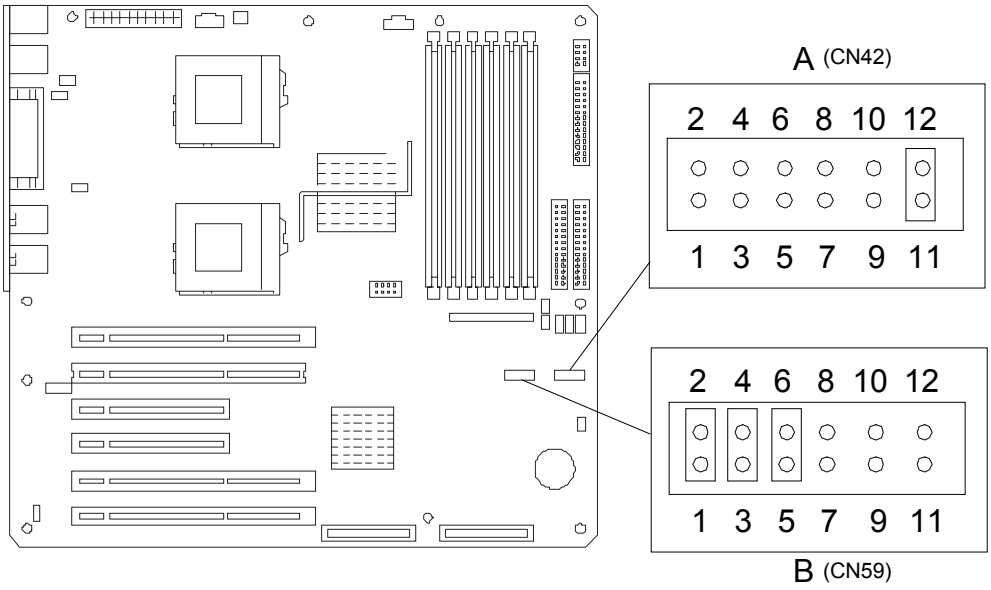


Figure 3-1. System Board Jumpers

Table 3-3. Password/CMOS System Board Jumper Summary

Jumper	Function	Jumper On/Off (default in bold)	What it does at system reset.
1 - 2	CMOS clear	**Off, Protect** On, Erase	Preserves the contents of CMOS. Clears CMOS.
3 - 4	Password disable	**Off, Enable** On, Disable	Enables password protection. Disables the password.
5 - 6	Reserved	**Off, Not Used**	Do Not Change.
7 – 8	Reserved	**Off, Not Used**	Do Not Change.
9 – 10	Reserved	**Off, Not Used**	Do Not Change.
11 - 12	Spare	Off, Not Used **On, Spare**	Provides a spare jumper.

Table 3-4. CPU Speed Select Jumper Options

CPU Speed	CPU Speed Select Jumper Settings*			
	1 – 2	**3 – 4**	**5 – 6**	**7 – 8**
1.0 GHz	Closed	Open	Open	Open
1.26 GHz**	Closed	Closed	Closed	Open
1.33 GHz***	Open	Closed	Open	Open
1.40 GHz***	Open	Closed	Closed	Closed
1.46 GHz***	Open	Open	Open	Closed
1.53 GHz***	Open	Closed	Closed	Open
1.60 GHz***	Open	Open	Closed	Closed

* Jumper pins 9-10 and 11-12 open.
** Setting shown in Figure 3-1
***Not all CPU speeds are qualified and supported. Please contact your sales representative for a list of qualified CPU speeds.

Moving System Board Jumpers

⚠ CAUTION

Before doing the procedures in this section, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before moving the jumpers can result in personal injury and equipment damage.

Observe static precautions. Use an antistatic wrist strap.

To configure the system board options:

1. Power off the system and remove the left panel as described in Chapter 4 of this guide.
2. Check to ensure the system power cord is removed from the back of the system.
3. Locate the position of the jumpers on the system board you are changing. See Figure 3-1. To change a jumper setting, use a pair of needle-nose pliers or your fingers to remove the jumper from its current location. Position the jumper over the two pins for the desired setting and press it onto the pins. Be careful not to bend the pins. Refer to Table 3-3 for system board jumper settings.
4. Install the system cover and power up the system.

Clearing and Changing the Passwords

To clear and change the passwords:

1. Power off the system and remove the left side panel as described in Chapter 4 of this guide.
2. Check to ensure the system power cord is removed from the back of the system.
3. Remove the spare jumper from position 11 - 12 on jumper block.
4. Install the spare jumper on position 3 - 4 (Password Disable) of the jumper block. Refer to Figure 3-1 and Table 3-3 to find the location of this jumper.
5. Connect the power cord, power on the system and while waiting for POST to complete, press the F2 key to enter BIOS setup. This automatically clears all passwords, provided you exit and save the BIOS setup.
6. Power off the system and remove the power cord.
7. Remove the Password Disable jumper from pins 3-4 and store it in position 11 - 12.
8. Replace the left side panel, connect the power cord and power on the system.
9. To specify a new password run the BIOS Setup Utility as described earlier in this chapter.

Clearing CMOS

Clear CMOS as follows.

1. Power off the system and remove the left side panel as described in Chapter 4 of this guide.
2. Check to ensure the system power cord is removed from the back of the system.
3. Remove the spare jumper from position 11 - 12 on jumper block.
4. Install the spare jumper on position 1 - 2 (CMOS Clear) of the jumper block. Refer to Figure 3-1 and table 3-3 to find the location of this jumper.
5. Connect the power cord, power on the system and after POST completes, power down the system and unplug the power cord.
6. Remove the jumper from pins 1-2 and store the jumper on pins 11-12.
7. Replace the left side panel, connect the power cord, and power on the system.
8. Press **F2** at the prompt to run the BIOS Setup utility, and select “Get Default Values” at the Exit menu.

4

Upgrading Your System

- General Information
- Static Precautions
- Equipment Log
- Tools Recommended for Upgrading Your System
- Preparing Your System for Upgrade
- Removing the Side Access Panel
- Installing the Side Access Panel
- Cooling Fan Unit
- Modifying the System Board
- Option Boards
- Installing a RAID Controller Board
- Removable 5.25-Inch Media Devices
- Hard Disk Drives
- Installing the Hot-Swap SCSI Hard Disk Drive Bay Upgrade Kit
- Installing the Optional Hot-Swap Power Supply
- Hot-Swapping a Power Supply

General Information

⚠ WARNING

The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cord from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

⚠ CAUTION

Operating your system with the side access panels removed can damage your system components. For proper cooling and airflow, always replace the side access panels before powering on your system.

⚠ WARNING

Avoid burns: If the system has been running, any installed processor and heat sink on the processor board(s) will be hot. To avoid the possibility of a burn, be careful when removing or installing components that are located near processors.

Contact your sales representative or dealer for a list of approved optional peripheral devices.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Equipment Log

Use the equipment log form located at the end of this manual to record the model and serial number of your system, all installed options, and any other pertinent information specific to your system. You will need this information when configuring your system.

Tools Recommended for Upgrading Your System

Depending on the upgrade, you will need one or more of the following tools:

- Phillips screwdriver (#1 bit and #2 bit)
- Flat-head screwdriver
- Small needle nose pliers
- Pen or pencil
- ESD workstation or antistatic wrist strap (recommended)

Preparing Your System for Upgrade

To prepare your system for installation or removal of system components perform the following procedure:

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Open the front door of your system's cabinet. For tower-based systems see *Opening the Front Door of the Tower Cabinet* in Chapter 2. For rack-mount systems you must remove the front panels of the system chassis.
3. Shutdown the operating system (OS).
4. Press the power on/off switch on the front panel of the server (see *Front View* in Chapter 2). The power-on LED goes out.
5. Power off the peripheral devices.
6. Unplug the system power cord(s) from the AC wall outlet(s).

> ***Note:*** If the system power cord is connected to a power control unit such as an UPS (Uninterruptible Power Supply), refer to the UPS user's guide for proper power-off procedures.

7. Unplug all the I/O cables connected to the rear panel of your system.

Removing the Side Access Panel

To install options in your system, you must remove the access panel on the left-hand side of the system (as viewed from the front). The side access panel on the right-hand side of the system (as viewed from the front) does not have to be removed.

⚠ CAUTION

For proper cooling and airflow, do not operate the system with the side access panel removed. Always **replace** the panel before powering on the system.

⚠ WARNING

If you are removing the side access panel after the system is set up, you must first power off the system and all external devices and then **unplug** the system power cord(s).

To remove the **left-hand** side access panel (see Figure 4-1):

1. Prepare your system for upgrade. See *Preparing Your System for Upgrade* earlier in this chapter.
2. The left-hand side access panel is secured to the chassis with two thumbscrews. Loosen the thumbscrews securing the side access panel.
3. Using the indentation on the side of the panel, slide the side access panel toward the rear of the system. This unlocks the locking fingers behind the side access panel.
4. Pull the side access panel out and away from the chassis.

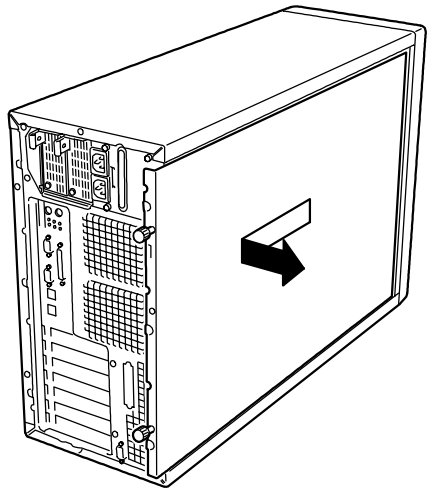


Figure 4-1. Removing the Left-Hand Side Access Panel

Installing the Side Access Panel

To install the **left-hand** side access panel (see Figure 4-2):

1. Check to make sure that no tools or loose parts have been left inside the system chassis.
2. Make sure all option boards are firmly seated in their respective slots and that all interior cables are properly connected.
3. Insert the locking fingers on the top and bottom of the side access panel into their slots on the chassis. Then slide the side access panel forward as far as it will go.

> ***Note:*** Ensure that the side access panel is installed properly and securely fastened. A cover sensor (intrusion switch) monitors the left-hand side access panel.

4. Tighten the side access panel thumbscrews.

> ***Note:*** If your system is already set up, plug the system back in, reconnect the peripherals, and power on the peripherals and system.

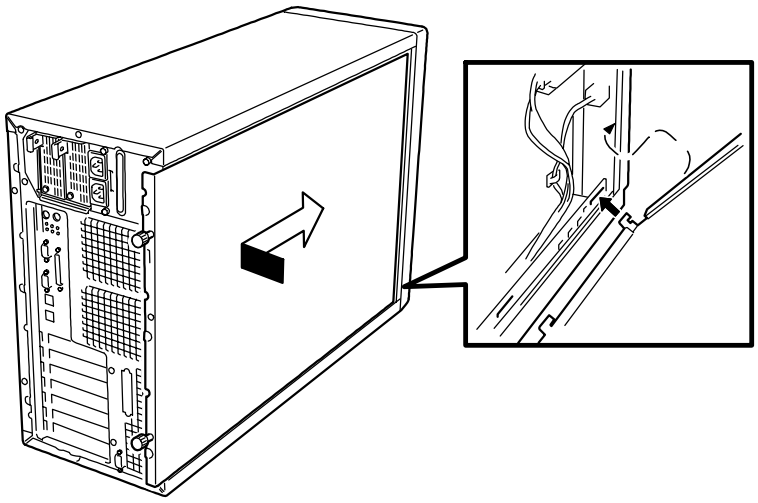


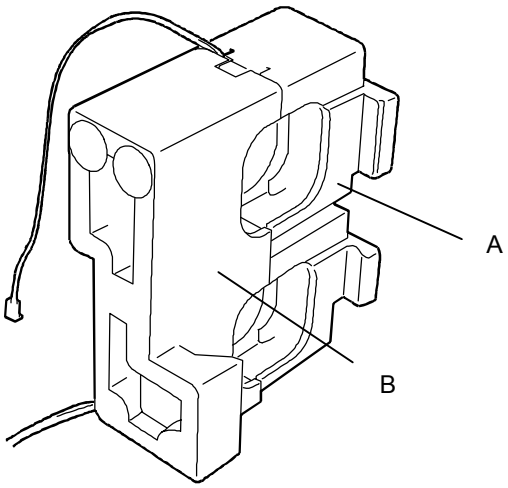
Figure 4-2. Installing the Left-Hand Side Access Panel

Cooling Fan Unit

The cooling fan unit houses two fans for cooling the boards and devices inside your server. The cooling fan unit is composed of a fan module (A) and a fan cover (B). See Figure 4-3.

The cooling fan unit must be removed when plugging or unplugging power or signal cable connectors at the rear of the hard disk drive bays.

The cooling fan cover must be removed for the installation or removal of long PCI boards.



A – Fan module
B – Fan cover

Figure 4-3. Cooling Fan Unit

Removing the Fan Cover

To **remove** the fan cover, perform the following procedures:

1. Prepare your system for upgrade. See *Preparing Your System for Upgrade* earlier in this chapter.
2. Remove the left-hand side access panel of the system chassis. See *Removing the Side Access Panel* earlier in this chapter.

> **⚠ CAUTION**
> For proper cooling and airflow, do not operate the system with the side access panel removed. Always **replace** the panel before powering on the system.

3. While holding the fan module securely, grasp and pull the fan cover out to free it from the module and then remove it from the system chassis. See Figure 4-4.

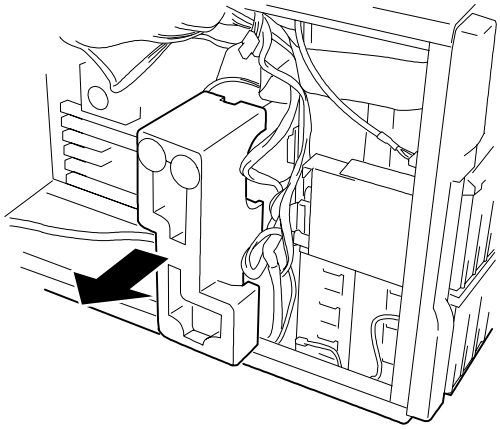


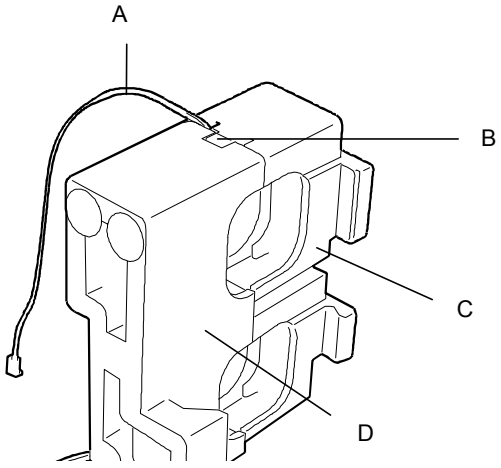
Figure 4-4. Removing the Fan Cover

Installing the Fan Cover

To **install** the fan cover, perform the following procedures:

1. Make sure all option boards are firmly seated in their respective slots and that all interior cables are properly connected.
2. Insert the fan cover on top of the fan module and push it in until it is fully seated. Make sure the fan cover is oriented for the direction of air flow and that the fan cable coming from the fan module is not restricted in any way. The fan cable must be routed through the slot in the fan module. See Figure 4-5.

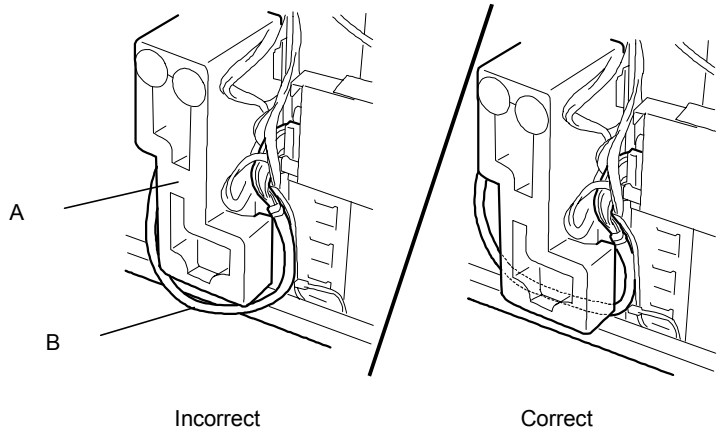
Note: Ensure that the cover is installed properly and securely.



A – Fan cable
B – Fan module slot
C – Fan module
D – Fan cover

Figure 4-5. Fan Cable Routing

3. Check and make sure that the I^2C cable is routed through on the inner side of the fan cover. If the cable is not routed properly the side cover will not install correctly. See Figure 4-6.



A – Fan cover
B – Diskette cable

Figure 4-6. Diskette Cable Routing

4. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
5. Plug in the system power cord(s) and power up the system.

Removing the Fan Module

To **remove** the fan module, perform the following procedures:

1. Prepare your system for upgrade. See *Preparing Your System for Upgrade* earlier in this chapter.
2. Remove the left-hand side access panel of the system chassis. See *Removing the Side Access Panel* earlier in this chapter.

⚠ CAUTION

For proper cooling and airflow, do not operate the system with the side access panel removed. Always **replace** the panel before powering on the system.

3. If your server is a redundant hot-swap system you must move the hard disk drive cage(s) in order to free up the fan module so that it is not confined when sliding it out of the chassis. Otherwise, go to step 6.

4. Remove the five screws securing the hard disk drive cage(s) to the front of the chassis. Save the screws for reinstallation.
5. Pull the hard disk drive cage(s) out the front of the chassis approximately one inch (5 cm).
6. Remove the fan cover. See *Removing the Fan Cover* earlier in this chapter.
7. Tag and disconnect the two cooling fan cable connectors from their mating connectors on the system board.
8. Grasp and pull the fan module out the side of the chassis and remove it. See Figure 4-7.

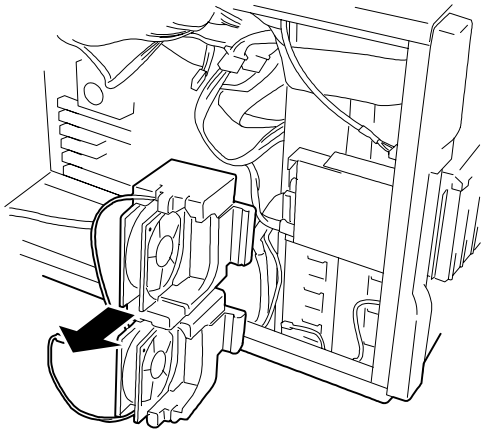


Figure 4-7. Removing the Fan Module

Installing the Fan Module

To **install** the fan module, perform the following procedures:

1. Make sure all option boards are firmly seated in their respective slots and that all interior cables are properly connected.
2. Reconnect the two cooling fan cable connectors to their mating connectors on the system board.

⚠ CAUTION

Always make sure that you connect the fan cable connectors to their specific cable connectors on the system board. If the fan cable connectors are not connected to their specific cable connectors on the system board the fans will not operate. This may cause a rise in chassis temperature and a malfunction to occur.

3. Insert the fan module and push it in until its tabs are fully seated in their corresponding holes in the chassis (see Figure 4-8). Make sure the fan module is oriented for the direction of airflow and that the fan cables coming from the fan module are not restricted in any way. The fan cable must be routed through the slot in the fan module.

4. Reinstall the fan cover on the fan module. See *Installing the Fan Cover* earlier in this chapter.

> ***Note:*** Ensure that the cover is installed properly and securely.

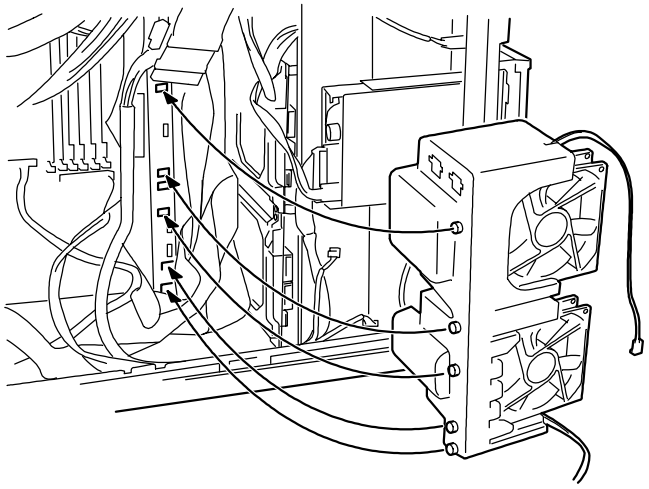


Figure 4-8. Installing the Fan Module

6. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.

7. Plug in the system power cord(s) and power up the system.

Modifying the System Board

The following sections provide procedures for upgrading and configuring the system board in your system. Topics covered include:

- Replacing the real-time clock battery
- Removing and installing a processor
- Installing or removing DIMMs.

⚠ CAUTION

Electrostatic discharge (ESD) can damage add-in boards and other components; place them on an antistatic surface. Modify the system board only at an ESD workstation. Otherwise, wear an antistatic wrist strap attached to chassis ground.

Replacing the Real-time Clock Battery

You may need to replace the real-time clock (RTC) battery because of its life span. The battery powers the clock in the absence of power. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM (for example, the date and time) may be wrong.

The 3V battery (Vendor Part #CR2032) is a commodity part available through many vendors. It is located on your system board (see Figure 4-9). Notice the plus (+) sign on the battery. This sign will assist you in correctly positioning the battery on the system board. Contact your sales representative or dealer for a list of approved devices.

⚠ CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by manufacturer. Dispose of lithium batteries as required by local ordinance or as normal waste if no local ordinance exists. Do not expose the component to excessive heat or fire. Keep all batteries away from children

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap.

To replace the RTC battery, perform the following procedures:

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Open the front door of your system's cabinet. For tower-based systems see *Opening the Front Door of the Tower Cabinet* in Chapter 2. For rack-mount systems you must remove the front panels of the system chassis.
3. Shutdown the operating system (OS).
4. Press the power on/off switch on the front panel of the server (see *Front View* in Chapter 2). The power-on LED goes out.
5. Power off the peripheral devices.
6. Unplug the system power cord(s) from the AC wall outlet(s).

> ***Note:*** If the system power cord is connected to a power control unit such as an UPS (Uninterruptible Power Supply), refer to the UPS user's guide for proper power-off procedures.

7. Remove the left-hand side access panel of the system chassis. See *Removing the Side Access Panel* earlier in this chapter.

> **⚠ CAUTION**
>
> For proper cooling and airflow, do not operate the system with the side access panel removed. Always **replace** the panel before powering on the system.

8. If present, remove the protective plastic cover located over the top of the lithium battery (see Figure 4-9).
9. Insert the tip of a small flat-bladed screwdriver, or equivalent, under the plastic tab on the plastic retainer (see Figure 4-9, A).
10. Gently push down on the screwdriver to lift the battery (see Figure 4-9, B).
11. Remove the battery from its socket (see Figure 4-9,C).
12. Dispose of the battery according to local ordinance.
13. Remove the new lithium battery from its package, and, being careful to observe the correct polarity (plus sign (+) up) insert it into the battery socket.
14. If applicable, reinstall the plastic cover on the lithium battery socket.
15. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
16. Plug in the system power cord(s), and turn on the system.
17. Run the BIOS Setup to restore the configuration settings to the real-time clock.

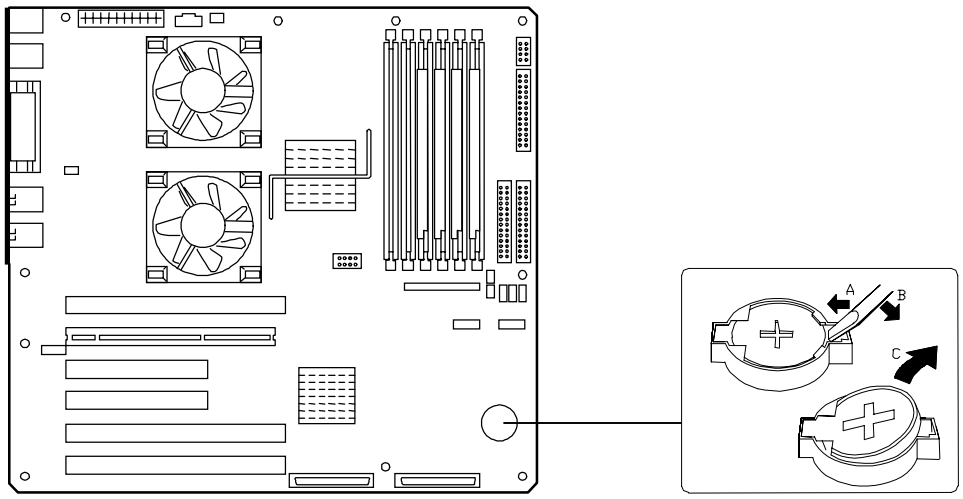


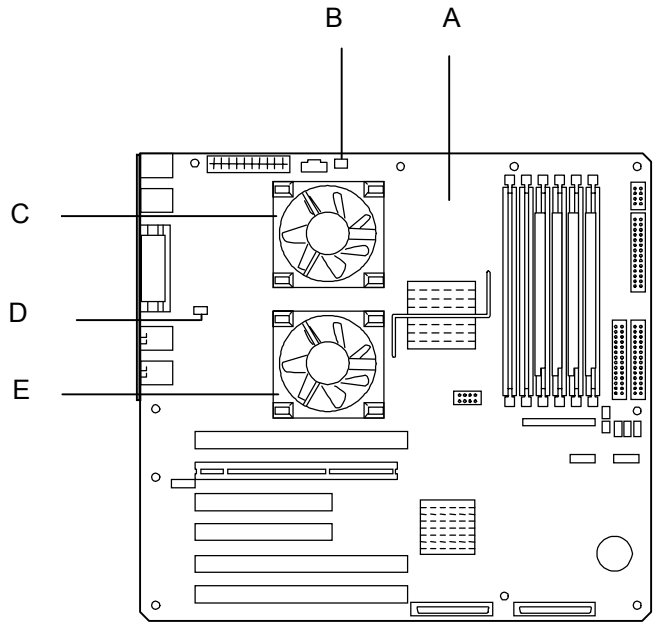
Figure 4-9. Replacing the Real-Time Clock Battery

Removing and Installing a Pentium III Processor

This subsection provides the procedures for removing and installing a Pentium III processor in your system. The system board has sockets for two processors. Each Pentium III processor plugs into a standard PGA370 connector. The processor comes with up to 512K cache. The primary processor connector is shown in the illustration below (see Figure 4-10, C). The secondary processor connector is shown in the illustration below (Figure 4-10, E).

⚠ CAUTION

Electrostatic discharge (ESD) can damage components; place them on an antistatic surface. Modify the system board using an antistatic wrist strap attached to chassis ground.



A – System board
B – Heat sink cooling fan connector for CPU #1
C – Primary connector for CPU #1
D – Heat sink cooling fan connector for CPU #2
E – Secondary connector for CPU #2

Figure 4-10. System Board Pentium III Processor and Fan Heat Sink Connectors

⚠ WARNING

If the system was running, any processor and heat sink installed is hot. To avoid the possibility of a burn, let the components cool for 10 minutes before continuing with these procedures.

Installing a Processor

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.

> **⚠ CAUTION**
> Observe static precautions. Use an antistatic wrist strap.
> Hold the processor only by its edges.

4. If your system has one processor (CPU #1) and you are adding a second processor (CPU #2), then you must remove the termination board in the secondary connector and store it appropriately.
   - To remove a terminator, perform step 7. Otherwise, continue.
5. If your system has one processor and you are replacing it, leave the terminator board intact in the empty secondary processor connector. Remove the processor you want to replace. See *Removing a Processor or Terminator Board* later in this chapter.
6. If your system has two processors and you are replacing one or both, remove the appropriate one(s). See *Removing a Processor or Terminator Board* later in this chapter.
7. Raise the lever on the socket to its up position and remove the terminator or processor and place it on a grounded, static-free surface or conductive foam pad. See Figure 4-11.

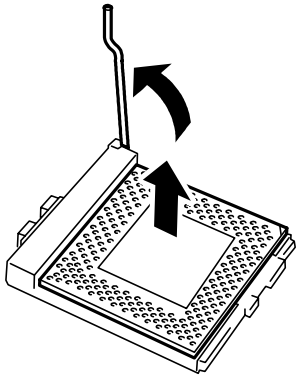


Figure 4-11. Removing a Processor or Terminator

8. Put the old processor in a piece of conductive foam and store in an antistatic package.
9. Remove the new processor from its antistatic package and place it on a grounded, static-free surface or conductive foam pad.

10. Position the processor over the processor socket so that its pins align with the socket holes. See Figure 4-12.

> ***Note:*** Both the processor and processor socket have different pin assignments at two of its four corners to prevent misinsertion. Check the orientation pin mark and pin assignment on the socket to mount the processor correctly.

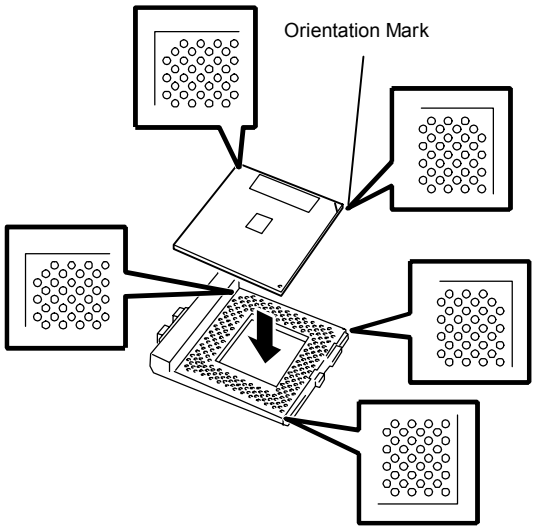


Figure 4-12. Mounting the Processor Correctly

11. Gently apply pressure equally over the top surface of the processor until it seats in the socket. The processor should fit, do not force the processor into the socket. Push the socket lever down until it snaps into the locked position. See Figure 4-13.

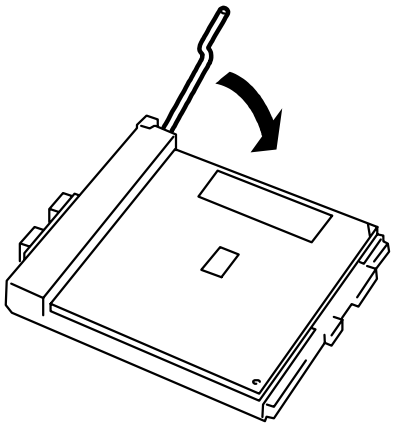
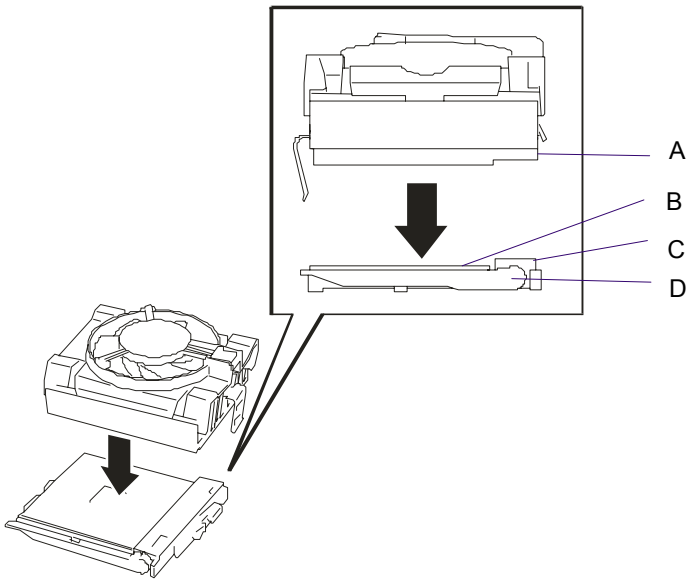


Figure 4-13. Installing a Processor

12. Position the heat sink on the processor so that the L-channel groove on its bottom face fits the lever and plastic end of the socket. See Figure 4-14.



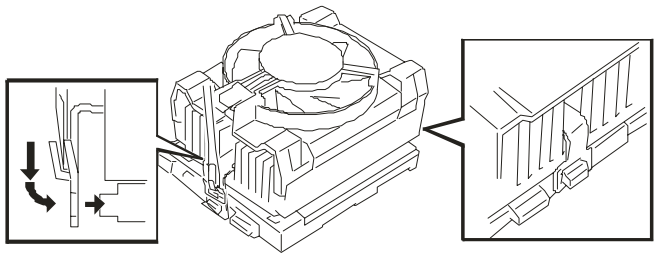
A – L-Channel groove
B –Processor
C – Plastic
D – Lever

Figure 4-14. Installing the Processor Heat Sink

13. Tip the heat sink so that the hole on the clip away from the fan connector fits over the tab on the base of the socket (1). Then insert a small screwdriver into the slot on the wire clip bracket, and hook the bracket over the other tab on the base of the socket, while pressing down on the bracket (2). See Figure 4-15.

⚠ CAUTION

Ensure that the heat sink is positioned properly on top of the processor so that it is level and not slanted. If for any reason it is out of position, removed the heat sink and reinstall it.



2 **1**

Figure 4-15. Securing the Processor Heatsink

14. Connect one end of the fan cable connector to the fan heat sink connector and the other end of the cable to its mating connector on the system board. See Figure 4-10.

⚠ CAUTION

Always make sure that you connect the fan heat sink cable connectors to their specific cable connectors on the system board. If the fan heat sink cable connectors are not connected to their specific cable connectors on the system board the fans will not operate. This may cause a rise in processor temperature and a malfunction to occur.

15. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.

16. Plug in the system power cord(s) and power up the system.

Removing a Processor or Terminator Board

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.

2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.

3. Remove the left-hand side access panel as described earlier in this chapter.

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap. Hold the processor only by its edges.

4. Locate the appropriate processor or terminator board socket on the CPU board. See Figure 4-10.

5. If you are removing a terminator board, refer to *Removing and Installing a Processor* earlier in this chapter. Otherwise go to the next step.

6. Disconnect the end of the fan cable on the fan heat sink. See Figure 4-10.

7. Remove the fan heat sink from the top of the processor by inserting a small screwdriver into the slot on its wire clip bracket and release the wire clip bracket. See Figure 4-16.

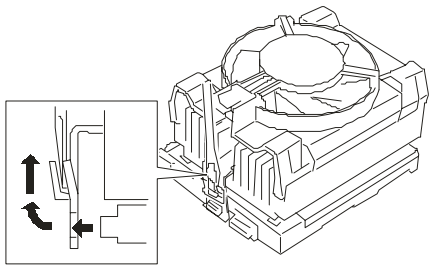


Figure 4-16. Removing the Processor Fan Heatsink

8. Swing its processor socket lever up until it is in the unlocked position and carefully remove the processor. See Figure 4-17.

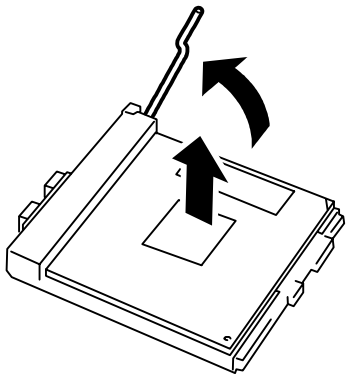


Figure 4-17. Removing the Processor

9. If you are adding or replacing a processor, refer to *Installing a Processor* earlier in this chapter.

10. If you are not replacing a processor, then you must replace it with a terminator in the empty socket. See *Installing a Processor* earlier in this chapter.

11. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.

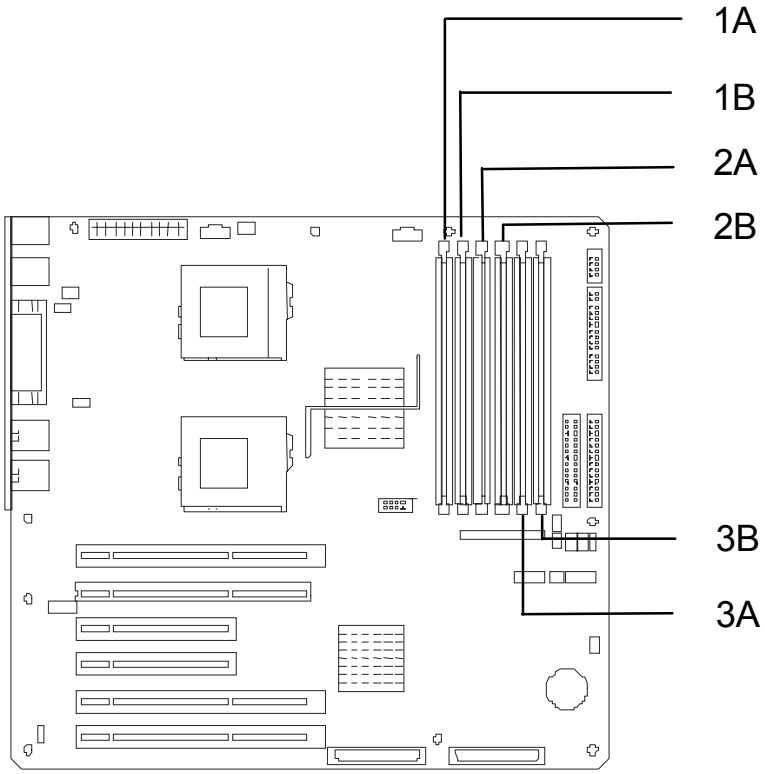
12. Plug in the system power cord(s) and power up the system.

DIMMs

The system board contains six DIMM sockets (Figure 4-18). Each socket can hold a single 72-bit DIMM module with 128MB, 256MB, 512MB, or 1GB of memory. When all six sockets are populated, the system board supports a maximum of 6 GB of memory with 1GB DIMMs.

Memory is partitioned as three banks of SDRAM that must be populated in pairs, each providing 72 bits of buffered two-way interleaved memory (64-bit main memory plus ECC). DIMMs will always be installed in sockets 1 and 2. When you install additional DIMMs, you must start with the first empty socket next to the last DIMMs already installed. When you remove DIMMs, you must start with the highest number occupied DIMM sockets on the system board.

> ***Note:*** DIMMs are always added in pairs in the ascending order of DIMM socket numbers.



1A	DIMM #1-A	DIMM Group #1
1B	DIMM #1-B	
2A	DIMM #2-A	DIMM Group #2
2B	DIMM #2-B	
3A	DIMM #3-A	DIMM Group #3
3B	DIMM #3-B	

Figure 4-18. DIMM Locations on the System Board

Installing DIMMs

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.
4. Locate the appropriate DIMM sockets on the system board (see Figure 4-18).
5. Remove the DIMM connector cover from its socket (see Figure 4-19). Save the DIMM connector cover for future use.

> ***Note:*** If you are replacing a DIMM, you must first remove the DIMM from its socket (see *Removing DIMMs* later in this chapter).

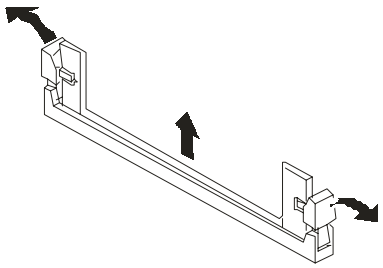


Figure 4-19. Removing the DIMM Connector Cover

6. Holding a DIMM module only by the edges, remove it from its antistatic package.

> **⚠ CAUTION**
> Observe static precautions. Use an antistatic wrist strap. Hold the DIMM only by its edges.

7. Position the DIMM so that the two notches in the bottom edge of the DIMM align with the keyed socket. See Figure 4-20.
8. Insert the bottom edge of the DIMM into the socket, and press down firmly on the DIMM until it seats correctly.
9. Gently push the plastic ejector levers on the socket ends to the upright position to ensure that they are installed correctly.

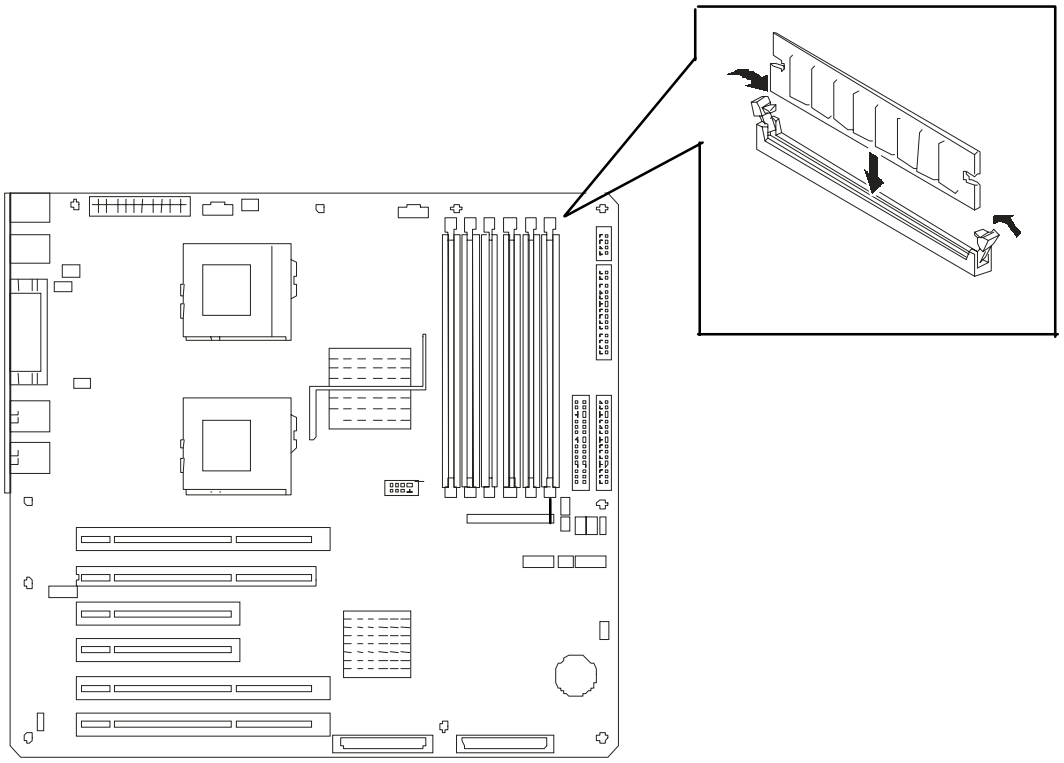


Figure 4-20. Inserting Memory DIMMs

10. Repeat the steps to install each additional DIMM.

11. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.

12. Plug in the system power cord(s) and power up the system.

Removing DIMMs

⚠ CAUTION

Use extreme care when removing a DIMM. Too much pressure can damage the socket slot. Apply only enough pressure on the plastic ejector levers to release the DIMM

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.
4. Locate the appropriate DIMM sockets on the system board (see Figure 4-18).
5. Gently push the plastic ejector levers out and down to eject a DIMM from its socket. See Figure 4-21.
6. Hold the DIMM only by its edges, being careful not to touch its components or gold edge connectors. Carefully lift it away from the socket, and store it in an antistatic package.

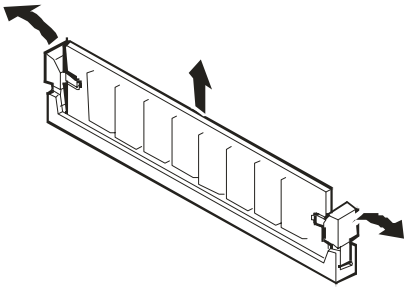


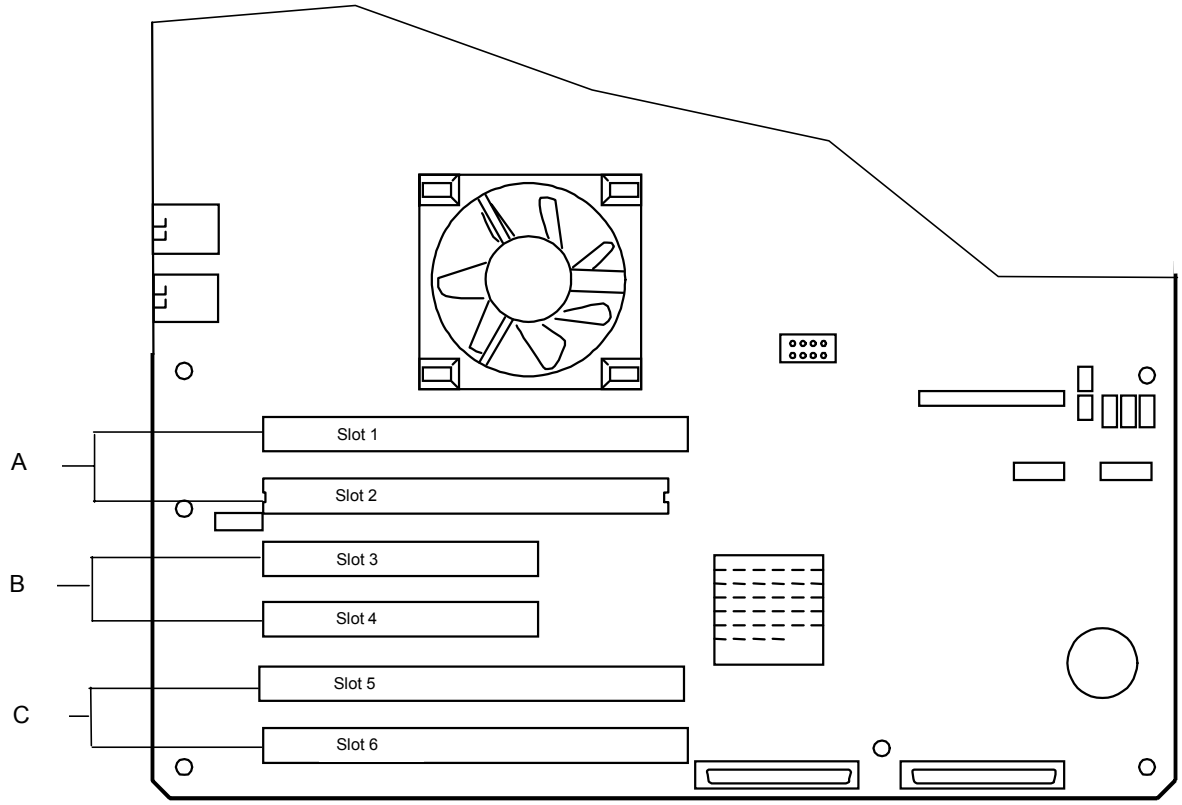
Figure 4-21. Removing a DIMM

7. Repeat the above steps to remove the remaining DIMMs.
8. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
9. Plug in the system power cord(s) and power up the system.

Option Boards

Your server's expansion capabilities meet the needs of file and application servers for high performance I/O by providing a combination of PCI expansion slots. This section describes how to install and remove the PCI option boards.

The I/O expansion slots in your server are located on the system board. See Figure 4-22. The system board has four 66 MHz PCI connector slots that accommodate 64 bit PCI cards and two 33 MHz PCI connector slots that accommodate 32 bit PCI cards.



A	64 bit/66 MHz 3.3 V signaling
B	32 bit/33 MHz 5.0 V signaling
C	64 bit/66 MHz 3.3 V signaling

Figure 4-22. PCI Slot Locations

Installing an Option Board

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.
4. If you are installing a full-length PCI board remove the fan cover. See *Removing the Fan Cover* earlier in this chapter.
5. Perform this step only when a PCI board is being installed or removed in slots 1, 2, and 3 and the external SCSI cable is plugged into the system board. Tag and disconnect the external SCSI cable connector plugged into the system board and move it out of the way temporarily.
6. Perform this step only when a PCI board is being installed or removed in slots 5 and 6. Remove the two screws securing the serial COM2 cable connector assembly to the rear of the chassis and move it out of the way temporarily. See Figure 4-23.

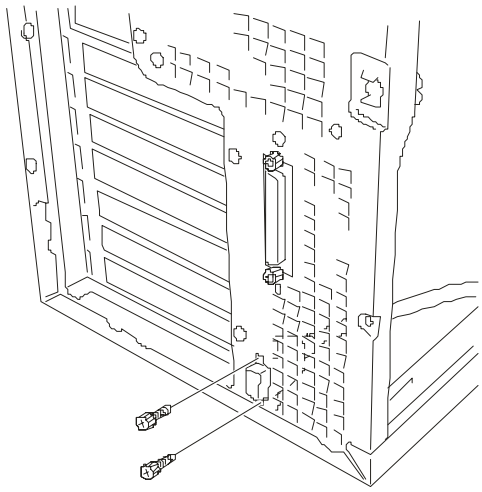


Figure 4-23. Removing the Serial COM2 Cable Connector Assembly

7. Remove the expansion slot connector cover. Save the connector cover for future use.
8. Remove the expansion slot setscrew (see Figure 4-24). Save the setscrew for reinstallation.
9. Remove the expansion slot cover from the inside of the cabinet by pushing it out the rear of its expansion slot with your fingers (see Figure 4-24). Save the expansion slot cover for future use.

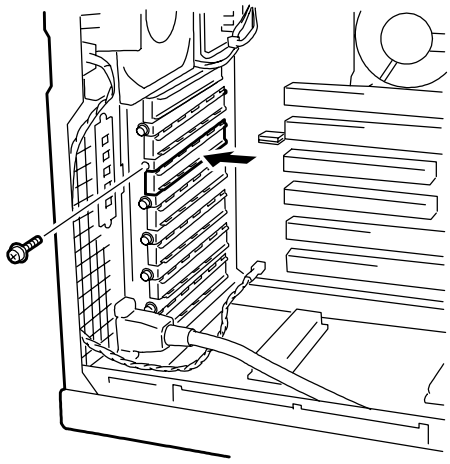


Figure 4-24. Removing the Expansion Slot Setscrew and Cover

10. Remove the option board from its protective wrapper, holding the board only by the edges. Do not touch the board components or the gold connectors.

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap.

11. Record the option board serial number in the equipment log.

12. Set any board jumpers or switches as described in the documentation that comes with the option board.

13. While holding the board by its top edge or upper corners and its component side facing down, firmly press the board into an expansion slot on the system board. The tapered foot of the option board retaining bracket must fit into the mating slot in the expansion slot. See Figure 4-25.

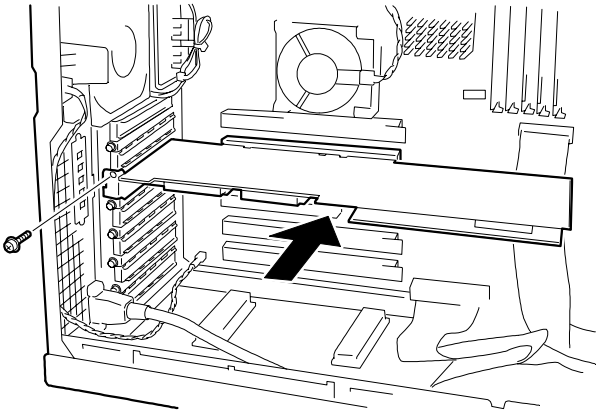


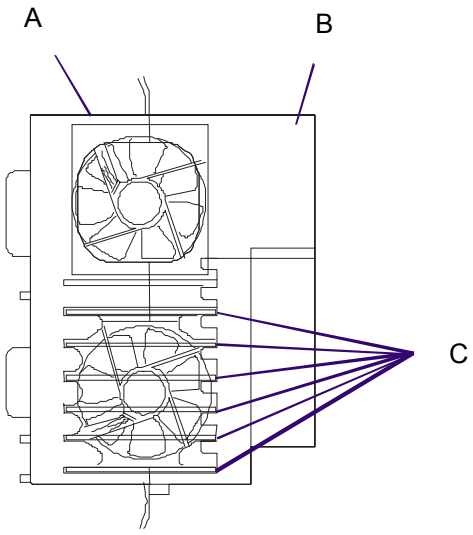
Figure 4-25. Installing an Option Board

14. Align the rounded notch in the retaining bracket with the threaded hole in the expansion slot frame. The retaining bracket fits into the space that was occupied by the expansion slot cover.

15. Reinstall the setscrew in the threaded hole. Be sure to push the bracket slot up against the setscrew before you tighten it. If this is not done, the bracket may interfere with an adjacent bracket.

16. Connect any external cables (if they are needed) to the installed option board.

17. If you installed a full-length PCI board you must also align the rear edge of the PCI board with the guide slots located in the fan cover (see Figure 4-26) removed in step 4 above. Then reinstall the fan cover, see *Installing the Fan Cover* earlier in this chapter.



A	Fan module
B	Fan cover
C	PCI board guide slots

Figure 4-26. Installing a Full-Length Option Board

18. If applicable, reinstall all components removed earlier in step 5 and step 6.

19. Replace the left side access panel and close the front door.

20. Plug in the system power cord, and power on the system.

Removing an Option Board

> **Note:** Expansion slot covers must be installed on all vacant slots to maintain the electromagnetic emissions characteristics of the system and to assure proper cooling of the system components.

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.
4. If you are removing a full-length PCI board remove the fan cover. See *Removing the Fan Cover* earlier in this chapter.
5. Perform this step only when a PCI board is being removed in slots 1, 2, and 3 and the external SCSI cable is plugged into the system board. Tag and disconnect the external SCSI cable connector plugged into the system board and move it out of the way temporarily.
6. Perform this step only when a PCI board is being removed in slots 5 and 6. Remove the two screws securing the serial COM2 cable connector assembly to the rear of the chassis and move it out of the way temporarily. See Figure 4-23.
7. Disconnect any cables attached to the option board you are removing.
8. Remove and save the option board retaining bracket setscrew.
9. Hold the board at each end and carefully rock it back and forth until the edge connectors pull free. Make sure that you do not scrape the board against other components.
10. Remove the board from the expansion slot and place it in an antistatic wrapper. If you are replacing a board, go to "Installing an Option Board" earlier in this chapter, otherwise continue.
11. Insert an expansion slot connector cover into the vacated slot.
12. Install an expansion slot cover over the vacant slot using the previously removed setscrew.
13. If applicable, reinstall the fan cover. See *Installing the Fan Cover* earlier in this chapter.
14. If applicable, reinstall all components removed earlier in step 5 and step 6.
15. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
16. Plug in the system power cord(s), and turn on the system.

Installing a RAID Controller Board

The functions of a disk array controller are described Table 4-1.

Table 4-1. Functions of a Disk Array Controller

Function	Description
Level	Support RAID levels RAID0, RAID1, RAID5, and RAID0+1.
Hot plug	Allows a hard disk to be replaced while the system is running depending on RAID level and system configuration.
Auto rebuild	After the defected hard disk is replaced with a new one, the data saved in the defected hard disk is automatically recovered from the data saved in the remaining hard disks depending on RAID level.
Expand capacity	The addition of a hard disk without system interruption can automatically expand the area in which disk arrays are available.

Please note the following when installing and configuring a disk array:

- Disk array controller boards are easily affected by static electricity. Handle the disk array controller board only after making body contact with the metallic frame section of the server chassis in order to discharge the static electricity from your body. Also, never make contact with terminals and components on the disk array controller board using your bare hands.
- To change the disk array configuration or the RAID level, the hard disks must be initialized. If important data is saved on the hard disks used to constitute a disk array, first back up the data on the other hard disks and then install the boards and configure the disk array.
- More than one hard disk is required to configure a disk array.
- Hard disks used in the disk array configuration should have the same disk revolution rate and capacity.
- Up to four disk array controller boards can be installed in your server.
- Several RAID (Redundant Arrays of Independent Disks) levels can be set for the newly installed disk array controller boards. For details of the available RAID types, data transfer rate, and array configurations refer to the online documentation on the *NEC EXPRESSBUILDER* CD-ROM that comes with your system or the vendor documentation that comes with the disk array controller.
- The available capacity of the hard disks in the disk array configuration will be lower than the capacity of the hard disks in a standard configuration, but the disk reliability is much improved.
- On the *Advanced* menu of the BIOS utility SETUP under submenu *PCI Configuration,* set the parameter "Option ROM Scan", to *Enable*.

- Replacement of a disk array controller board

  Use the configuration utility to restore the disk array configuration information in the disk array controller boards. For details, refer to the online documentation on the *NEC EXPRESSBUILDER* CD-ROM that comes with your system or the vendor documentation that comes with the disk array controller. If a disk array controller is replaced, use the proper utility to create new configuration information.

- When more than one disk array controller board is installed in your system, install the disk array controller board in the PCI slot with the highest boot priority (system disk boot slot). See Table 4-2.

  For example, if four disk array controller boards are installed in PCI slots 2 through 5, the system disk should be connected to the board installed in PCI slot 3.

Table 4-2. PCI Slot Boot Priority

PCI Slot Number	Boot Priority
PCI slot #1	3
PCI slot #2	4
PCI slot #3	1
PCI slot #4	2
PCI slot #5	5
PCI slot #6	6

Use this procedure to install a RAID controller board.

1. Install the RAID controller board into any PCI slot on the system board. See *Installing an Option Board* earlier in this chapter.
2. Cable the RAID controller board as described below:
   - Remove the end of the SCSI interface cable (1) that is plugged into the Ultra 160 SCSI hard disk drive bay connector (SCSI A) on the system board. See Figure 4-27.
   - Reinstall the end of the SCSI interface cable (2) just removed into the Channel 0 connector on the RAID board. See Figure 4-27.

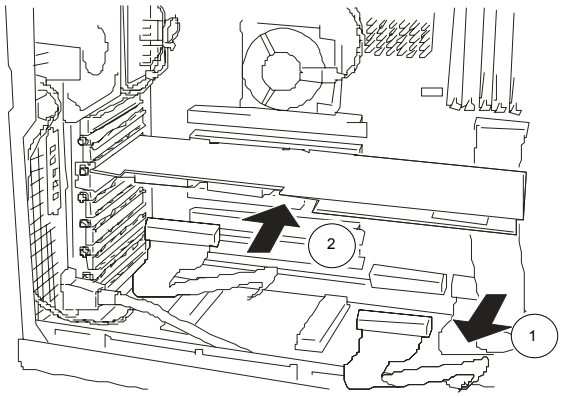
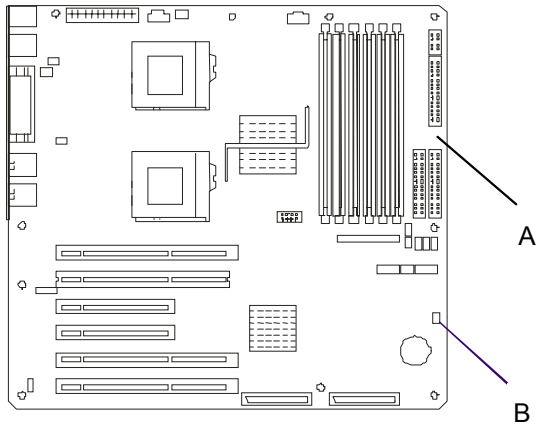


Figure 4-27. Cabling the RAID Controller Board

- Install one end of the disk array controller (DAC) LED cable into the LED cable connector on the RAID controller board and the other end of the cable into the DAC LED cable connector on the system board. See Figure 4-28.

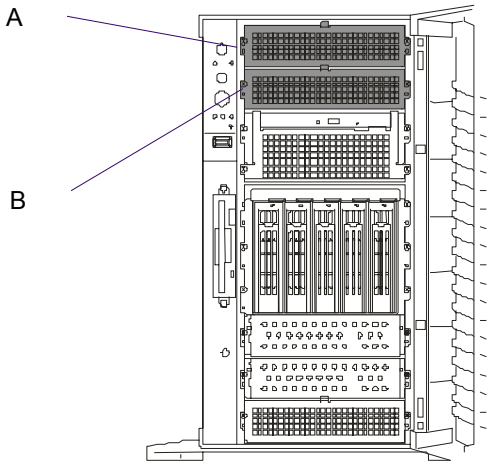


A	System board
B	DAC LED connector

Figure 4-28. Installing the DAC LED Cable

Removable 5.25-inch Media Devices

A variety of SCSI 5.25-inch removable media devices (i.e., tape backup, etc.) can be installed in the two half-height media bays (Figure 4-29). The media devices should be installed in the first available media bay from the top (slot 1). Contact your sales representative or dealer for a list of approved devices.



A	Slot 1
B	Slot 2

Figure 4-29. Removable Media Devices

If you are adding or removing a SCSI removable media device, consider the following:

- Set the termination of the 5.25-inch device to **off** and the SCSI ID to a value that is not assigned to any other device. Refer to the vendor documentation that comes with the device on how to set the values.

Installing a 5.25-Inch Media Device

To install a 5.25-inch media device, perform the following procedures:

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap.

4. Remove the dummy cover from the bay where you are installing a media device. The dummy cover is released by removing the two screws holding it in place (see Figure 4-30). Save the dummy cover and screws for future use.

Note: When installing a full-height device, remove two dummy covers.

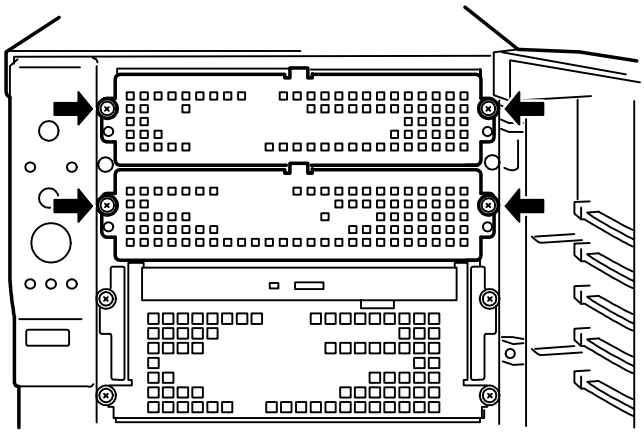


Figure 4-30. Removing the Dummy Cover

5. Remove the device from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number in the equipment log.
6. Set any drive jumpers or switches before you install the drive. See the documentation that comes with the device for jumper or switch information.
7. Attach the mounting rails to the device with the four screws that come with the device, as shown in Figure 4-31.

Note: If the drive comes with drive rails, do not use them. Remove any rails already attached.

⚠ CAUTION

When installing mounting rails on a removable device always use the screws that come with the device. Using longer screws or those of different diameter may cause damage to the device.

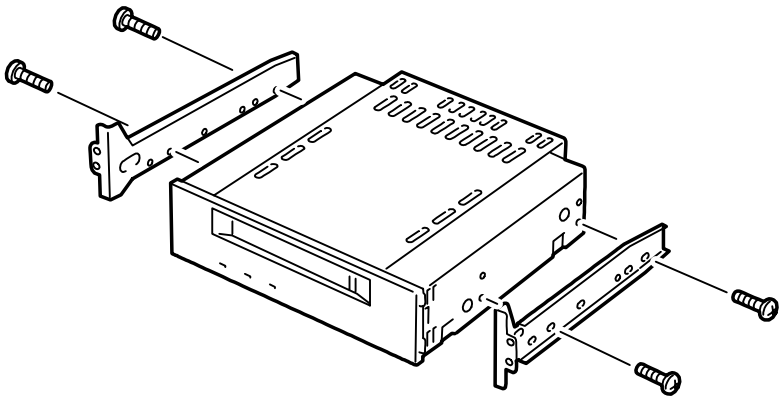
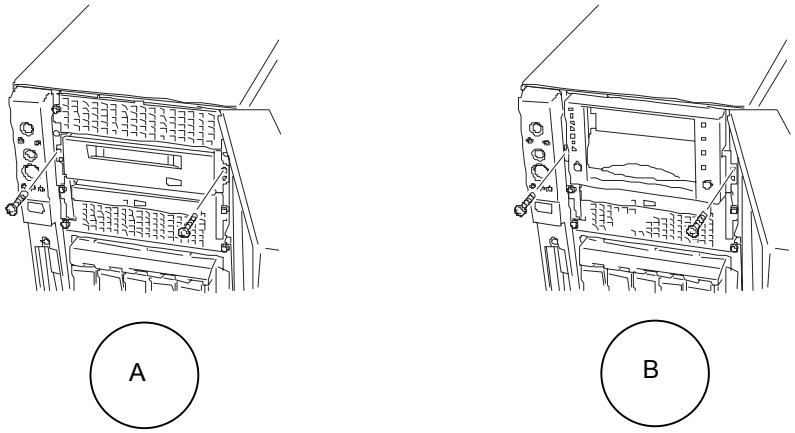


Figure 4-31. Attaching the Device Mounting Rails

8. Install the media device into the bay as follows:

- Move any cables in the bay out of the way.
- Align the rails on the media device with the support guides in the bay.
- Slide the device into the bay until the slide rails are flush with the system.

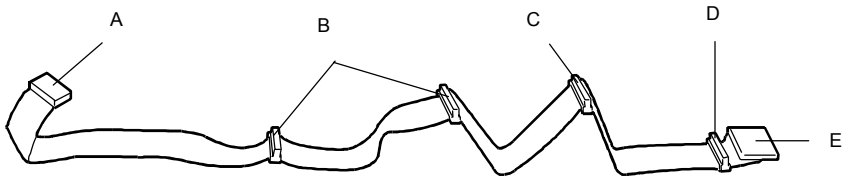
9. Secure the device to the system with the screws removed in step 4 above. See Figure 4-32.



A	Single-height device
B	Double-height device

Figure 4-32. Securing a Removable Media Device

10. Connect the SCSI interface cable (see Figure 4-33) to the device.



A	System board SCSI connector
B	Not used
C	5.25-inch device bay SCSI connector for slot 1
D	5.25-inch device bay SCSI connector for slot 2
E	Terminator

Figure 4-33. SCSI Interface Cable

11. Connect the power cable to the device.
12. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
13. Plug in the system power cord(s), and turn on the system.

Removing a 5.25-Inch Media Device

1. Perform Steps 1, 2, and 3 of Installing a 5.25-Inch Media Device described earlier in this chapter.
2. Disconnect the SCSI interface cable and voltage cable from the rear of the device you are removing.
3. Remove the two screws securing the device to the removable media device bay. See Figure 4-32.
4. Slide the removable media device out of the device bay and set it down on an antistatic surface.

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap.

5. Remove the screws securing the device mounting rails to the device and set the rails and screws aside for future use. See Figure 4-31.
6. To install a replacement device, perform steps 5 through 16 of *Installing a 5.25-Inch Media Device* described earlier in this chapter. Otherwise, continue with the next step.
7. Install a dummy cover into the vacated bay (see Figure 4-30).
8. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
9. Plug in the system power cord(s) and turn on the system.

Hard Disk Drives

Your system supports a variety of SCSI hard disk drives installed in the system's hard disk drive bay. Contact your sales representative or dealer for a list of approved devices. The SCSI hard disk drive bay in your system is one of two types: a non-hot-swap hard disk drive bay or a hot-swap hard disk drive bay. Refer to Figure 1-4 in chapter 1 to identify the type of hard disk drive bay in your system. In each example the internal hard disk drives are located in the SCSI disk drive bays.

Installing or Swapping a Hard Disk Drive in a Non-Hot-Swap Disk Drive Bay

This procedure describes installing a new hard disk drive or swapping out a disk drive in a SCSI disk drive bay. Disk drives must use the industry standard 68-pin Wide SCSI interface connector.

> ***Note:*** To order a hard disk drive, contact your sales representative or dealer.

- If installing new drives, follow an installation scheme starting with the top-most drive. Fill the bays top-to-bottom (1 through 5). See Figure 4-34.

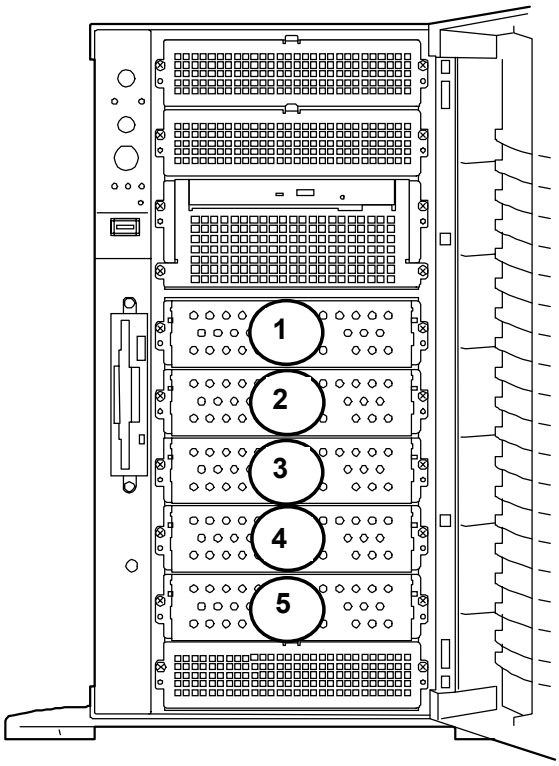


Figure 4-34. SCSI Disk Drive Installation Scheme

- The suggested hard disk SCSI address assignment is:

Bay	Device	SCSI ID Address
1	First Hard Disk (Top)	0
2	Second Hard Disk	1
3	Third Hard Disk	2
4	Fourth Hard Disk	3
5	Fifth Hard Disk (Bottom)	4

- Always install a disk carrier tray in an empty disk drive bay to maintain proper cooling.

> ***Note:*** ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are installing SCSI hard drives. However, we recommend that you do all procedures in this chapter only at an ESD workstation or provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.

Installing a Hard Disk Drive

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.

> **⚠ CAUTION**
> Observe static precautions. Use an antistatic wrist strap.

4. Remove the fan cover. See Removing the Fan Cover described earlier in this chapter.
5. Remove the disk carrier tray from the bay where you are installing the hard disk drive. The disk carrier tray is released by removing the two screws holding it in place (see Figure 4-35).

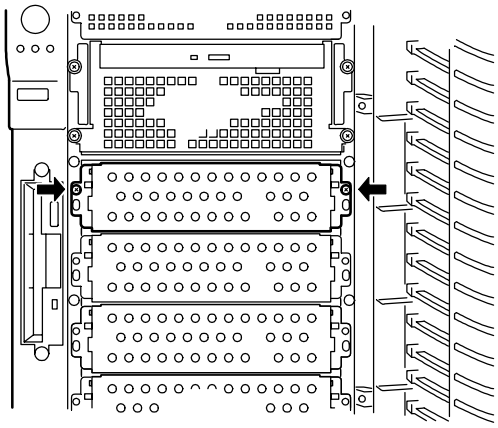


Figure 4-35. Releasing the Disk Carrier Tray

6. Slide the disk carrier tray out the front of the chassis. See Figure 4-36. Save the disk carrier tray and screws for reinstallation.

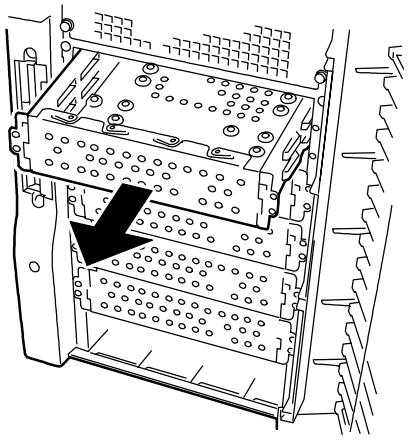


Figure 4-36. Removing the Disk Carrier Tray

7. Remove the device from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number in the equipment log.
8. Set any drive jumpers or switches before you install the drive. See the documentation that comes with the device for jumper or switch information.
9. Place the drive into the disk carrier tray removed in steps 5 and 6 above. Make sure the drives component side down and with the power and data connectors facing the rear of the carrier. The connectors should be flush with the rear of the carrier. See Figure 4-37.

> ***Note:*** If the drive comes with drive rails, do not use them. Remove any rails already attached.

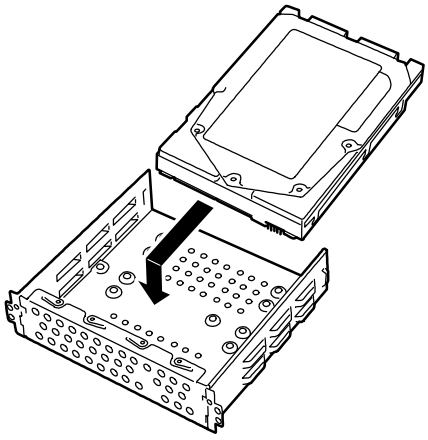


Figure 4-37. Placing the Hard Drive into a Disk Carrier Tray

10. While holding the drive in place turn the carrier upside down.

11. Line up the screw holes in the carrier with the screw holes in the drive. See Figure 4-38.

12. Using four screws of the appropriate size and length, secure the drive to the carrier.

⚠ CAUTION

When installing a disk drive in a carrier tray always use the screws that come with the device. Using longer screws or those of different diameter may cause damage to the device.

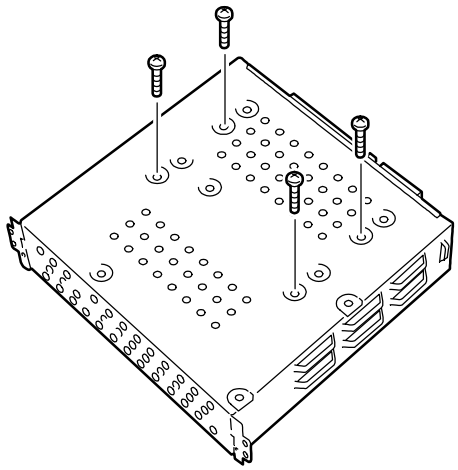


Figure 4-38. Securing the Hard Drive to a Disk Carrier Tray

13. Slide the disk carrier tray into the disk drive bay and secure it to the chassis with the screws previously removed in step 5 above. See Figure 4-39.

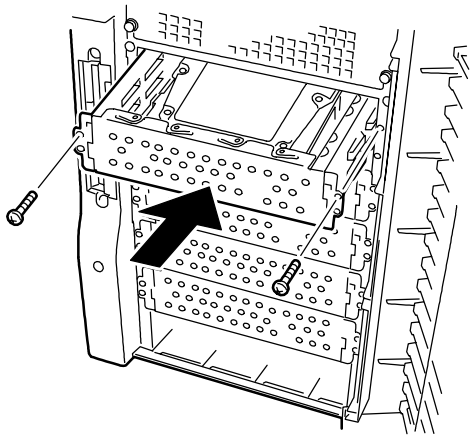


Figure 4-39. Installing the Disk Carrier Tray

14. Connect the SCSI interface and power cables to the drive.
15. Reinstall the fan cover. See Installing the Fan Cover described earlier in this chapter.
16. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
17. Plug in the system power cord(s), and turn on the system.

Swapping a Hard Disk Drive

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.

⚠ CAUTION

Observe static precautions. Use an antistatic wrist strap.

4. Remove the fan cover. See Removing the Fan Cover described earlier in this chapter.
5. Disconnect the SCSI interface and power cables attached to the drive.
6. Remove the disk carrier tray from the bay. The disk carrier tray is released by removing the two screws holding it in place (see Figure 4-35).
7. Slide the disk carrier tray out the front of the chassis. See Figure 4-40.

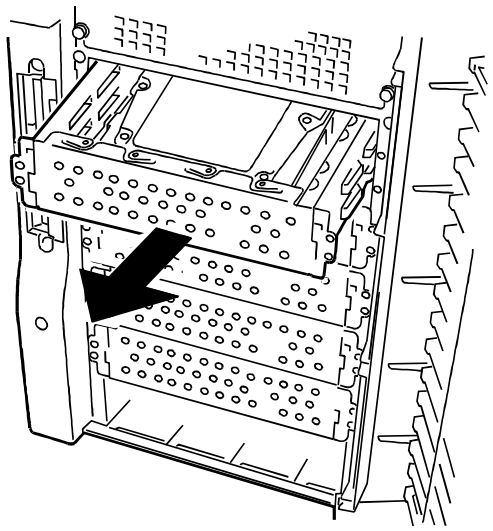


Figure 4-40. Removing the Disk Carrier Tray

8. Turn the disk carrier tray upside down.
9. While holding the disk drive in place remove the four screws securing the drive to the carrier and remove the drive. See Figure 4-38. Save the disk carrier tray and screws for reinstallation.
10. If you are installing a new or replacement hard disk drive, perform steps 7 through 17 of *Installing a Hard Disk Drive* described earlier in this chapter. Otherwise, continue with the next step.
11. Slide the empty disk carrier tray into the bay and secure it to the chassis with the screws previously removed in step 5 above. See Figure 4-41.

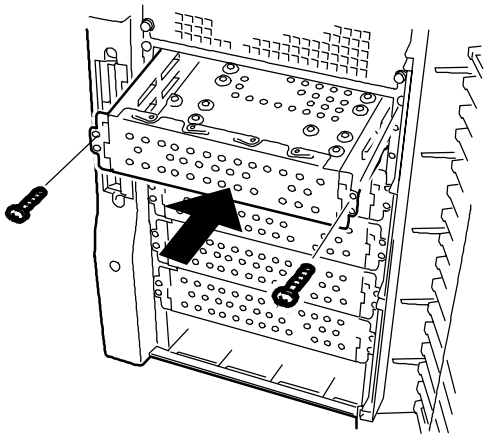


Figure 4-41. Installing the Disk Carrier Tray

12. Reinstall the fan cover. See Installing the Fan Cover described earlier in this chapter.
13. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
14. Plug in the system power cord(s), and turn on the system.

Installing or Swapping a Hard Disk Drive in a Hot-Swap Disk Drive Bay

This procedure describes installing a new hard disk drive or swapping out a faulty drive from one of the five hot-swap SCSI disk drive bays. The 3.5-inch SCSI disk drives must use the industry standard 80-pin single connector attachment (SCA) connector. Each drive must be installed in a carrier.

> ***Note:*** To order a hard disk drive, contact your sales representative or dealer.

- If installing new drives, follow an installation scheme starting with the right-most drive. Fill the bays right-to-left (1 through 5). See Figure 4-42.

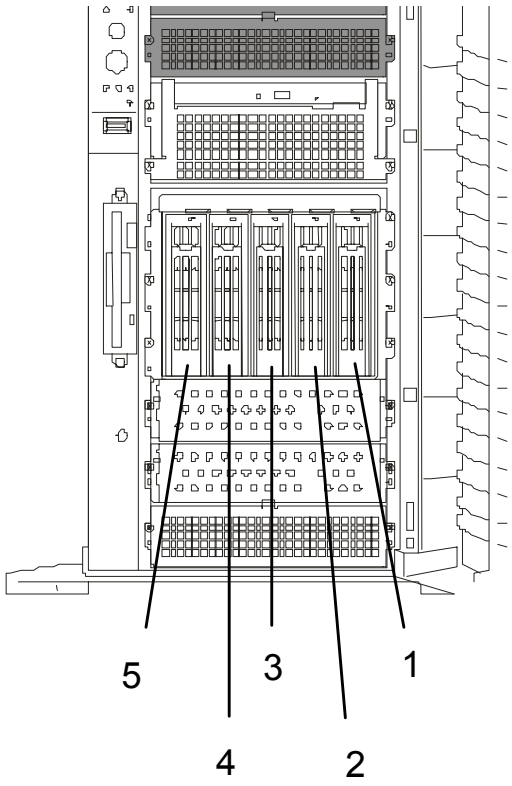


Figure 4-42. SCSI Disk Drive Installation Scheme

- The hard disk SCSI address assignment is:

Bay	Device	SCSI ID Address
1	First Hard Disk (Right)	0
2	Second Hard Disk	1
3	Third Hard Disk	2
4	Fourth Hard Disk	3
5	Fifth Hard Disk (Left)	4

- Always install a disk carrier tray in an empty disk drive bay to maintain proper cooling.

- If an individual SCSI drive activity/fault LED (amber light) is on steadily, this indicates that the drive has been flagged as faulty by the RAID host controller. Follow the procedure described in this section to remove the faulty drive and swap in a good one.

Note: ESD can damage disk drives, boards, and other parts. This system can withstand normal levels of environmental ESD while you are installing SCSI hard drives. However, we recommend that you do all procedures in this chapter only at an ESD workstation or provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground—any unpainted metal surface—on your system when handling parts.

Note: **Swap SCSI drives without turning off power.** This is one of the few system procedures that is safe to do with the system power left on. This is true only if a Redundant Array of Independent Disks (RAID) controller module is installed and an appropriate RAID level; is chosen and only for the drive/carrier assemblies in the hot-swap bays, *not for drives in any other bays*.

⚠ CAUTION

Drive manufacturer's caution against moving a disk drive that is still spinning because of possible damage to the drive.

Installing a Hard Disk Drive

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the disk carrier from the bay where you are installing the hard disk drive. The disk carrier is released by pressing the lock on the top of the carrier handle down, pulling the carrier handle towards you, and pulling the carrier from the bay. See Figure 4-43.

Note: The dummy disk carrier is provided to maintain the proper cooling effect. Leave the dummy disk carrier in unused slots so that the server can operate efficiently. (Keep all removed dummy disk carriers for future use.)

⚠ CAUTION

Do not insert your hand or any tool into the slot with the disk tray or dummy disk carrier removed. Failure to follow this caution may cause an electric shock or fire.

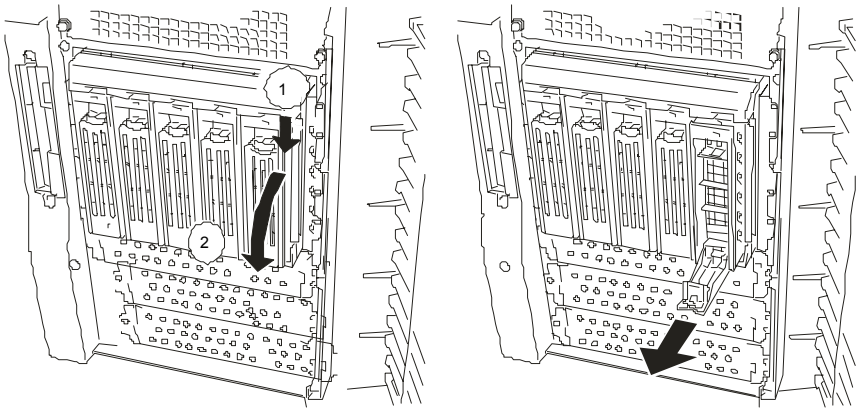
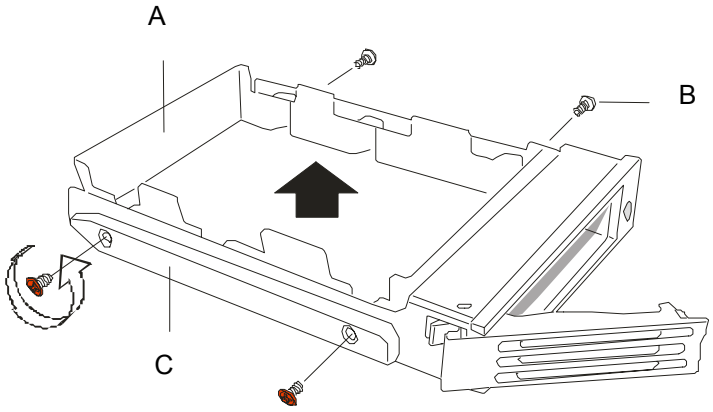


Figure 4-43. Releasing and Removing the Disk Carrier

4. Remove the four screws that hold the air baffle to the carrier and remove the air baffle. See Figure 4-44. Save the air baffle for future use.



A	Air baffle
B	Screws (4)
C	Drive carrier

Figure 4-44. Removing the Air Baffle

5. Remove the device from its protective wrapper and place it on an antistatic surface. Record the drive model and serial number in the equipment log.

⚠ CAUTION

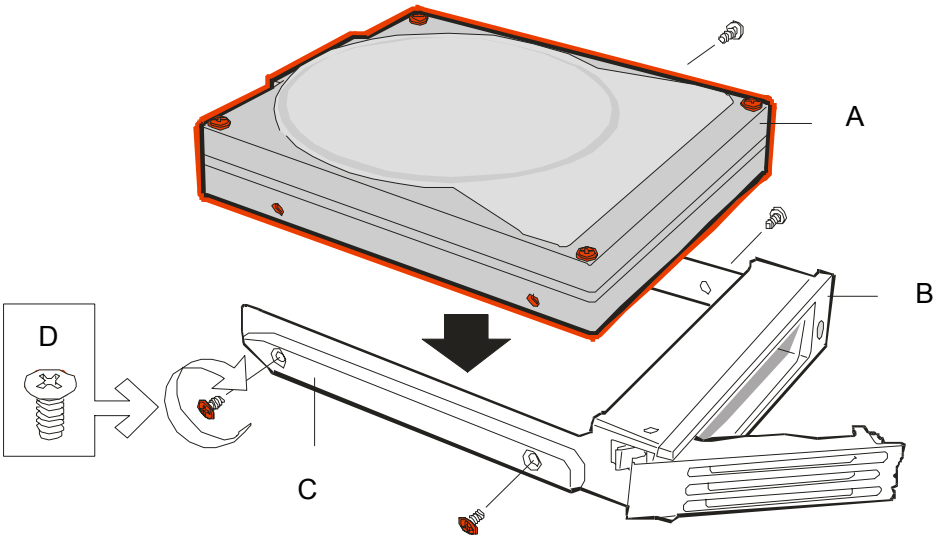
Observe static precautions. Use an antistatic wrist strap.

6. Set any drive jumpers or switches before you install the drive. See the documentation that comes with the device for jumper or switch information.

7. Place the drive into the disk carrier removed in steps 3 and 4 above. Orient the drive so that its component side is down and its data connector is facing the rear of the carrier. The connector should be flush with the rear of the carrier. See Figure 4-45.

Note: If the drive comes with drive rails, do not use them. Remove any rails already attached.

8. Using the four screws removed earlier, attach the carrier to the drive.



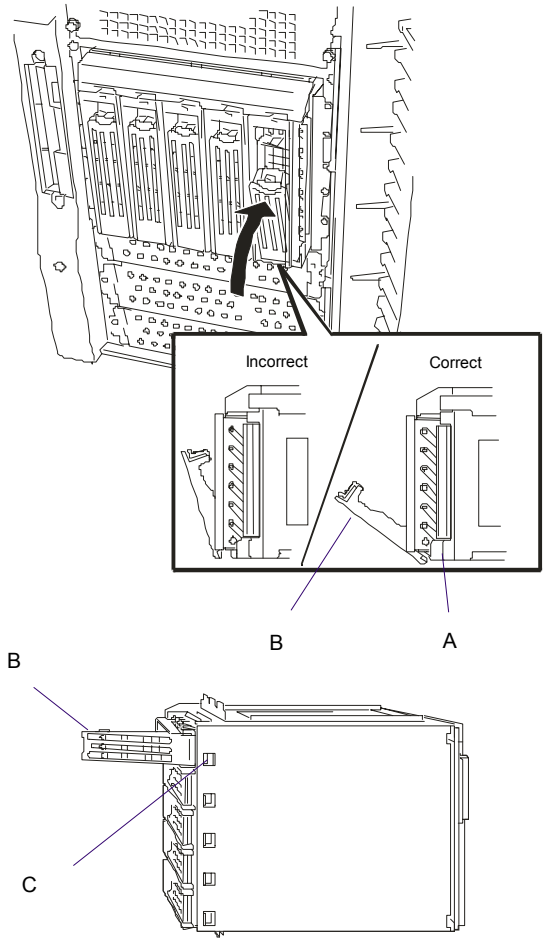
A	Hard disk drive
B	Drive carrier
C	Positioning rail
D	Screws (4)

Figure 4-45. Installing a Hard Disk Drive into the Carrier

9. While holding the drive carrier align it so that it engages the guide rails in the drive bay. See Figure 4-46.

10. Push the drive carrier into the bay until the locking tab on the bottom of its handle engages in the bottom frame slot.

11. Push the carrier handle up until the handle clicks and locks in place.



A	Locking tab
B	Handle
C	Frame slot

Figure 4-46. Installing a Hard Disk Drive into the Carrier

12. Close the front cover, plug in the system power cord(s), and turn on the system.

Swapping a Hard Disk Drive

When you are swapping out a faulty hard drive, you can determine which drive to remove by checking its SCSI drive activity/fault LED. See "Status LED Indicator Descriptions" in Chapter 2.

> ***Note:*** When the SCSI drive activity/fault LED indicates a drive fault (steady amber light), you can remove the drive and swap in a replacement at any time without needing to power down the system and provided RAID is configured in the system. Drive manufacturer's caution against moving a drive that is still spinning because of possible damage to the drive. Also, when the SCSI drive activity/fault LED indicates that the hard disk drive is being rebuilt (flashing amber light) do not remove the drive.

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Open the front door of your system's cabinet. For tower-based systems see *Opening the Front Door of the Tower Cabinet* in Chapter 2. For rack-mount systems you must remove the front panels of the system chassis.
3. Remove the drive and its carrier from the SCSI hard disk drive bay by performing the following procedures:

> **⚠ CAUTION**
>
> Depending on the drive fault, the drive may be still spinning when you remove it. Follow the next steps exactly when removing drives.

- Press the disk carrier handle lock downward to release it. See Figure 4-47.

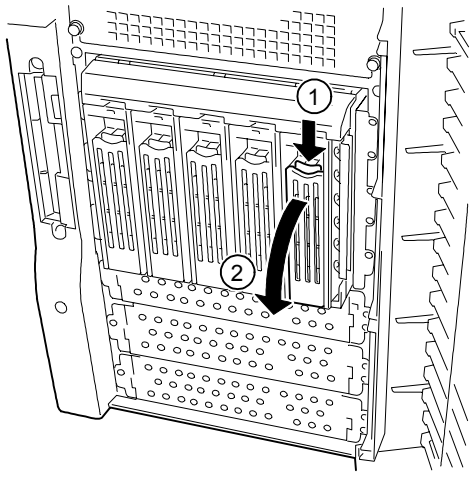


Figure 4-47. Releasing the Disk Carrier Tray

- Grasp the disk carrier handle and pull the faulty disk drive out of the bay far enough to disengage the drive connector from the backplane. Wait 30 seconds until the drive spins down. See Figure 4-48.

⚠ CAUTION

Drive manufacturer's caution against moving a disk drive that is still spinning because of possible damage to the drive.

- Remove the carrier from of the drive bay.

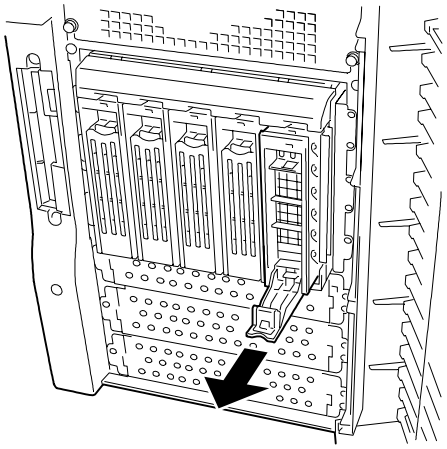


Figure 4-48. Removing the Disk Carrier Tray

4. Install the replacement drive carrier with drive into the bay, as follows:
   - Open the disk carrier handle lock.
   - While holding the drive carrier align it so that it engages the guide rails in the drive bay. See Figure 4-46.
   - Push the carrier handle up until the handle clicks and locks in place.
5. Close the front door on the system. If necessary, configure the system as described in Chapter 3 "Configuring Your System".

Note: In the disk array configuration, the auto rebuild function can be used. The auto rebuild function can record the information saved in a defected hard disk drive into the new replaced disk drive in order to recover the server to the state before the fault occurrence.

The auto build function is valid for disk arrays set to RAID1, RAID5, or RAID0+1.

The auto rebuild is automatically started by hot-swapping a defected hard disk drive. During the auto rebuild, the hard disk drive individual SCSI drive activity/fault LED is lit green or flashing amber.

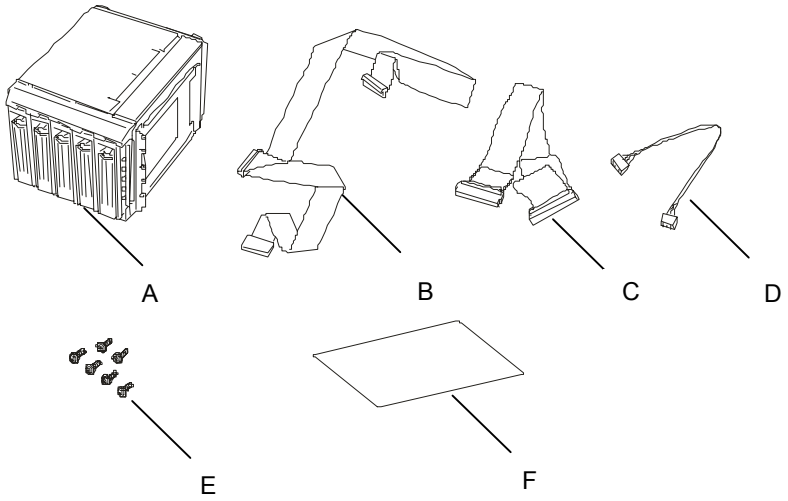
Installing the Hot-Swap SCSI Hard Disk Drive Bay Upgrade Kit

This subsection describes how to install the optional Hot-Swap SCSI Hard Disk Drive Bay Upgrade Kit.

⚠ WARNING

Before doing the procedures in this subsection, make sure that your system is powered off and unplug all AC power cords. Failure to disconnect power before opening your system can result in personal injury and equipment damage. All voltage is removed only when the power cords are unplugged.

All the items included in the upgrade kit are shown in Figure 4-49.



A	HDD cage
B	Two-way SCSI cable
C	SCSI cable
D	HSBP cable (I^2C)
E	Screws (6)
F	Installation guide

Figure 4-49. Contents of Hot-Swap SCSI Hard Disk Drive Bay Upgrade Kit

When installing hard disk drives into the new hard disk drive cage, follow an installation scheme starting with the right-most drive. Fill the bays right-to-left (1 through 5). See Figure 4-50.

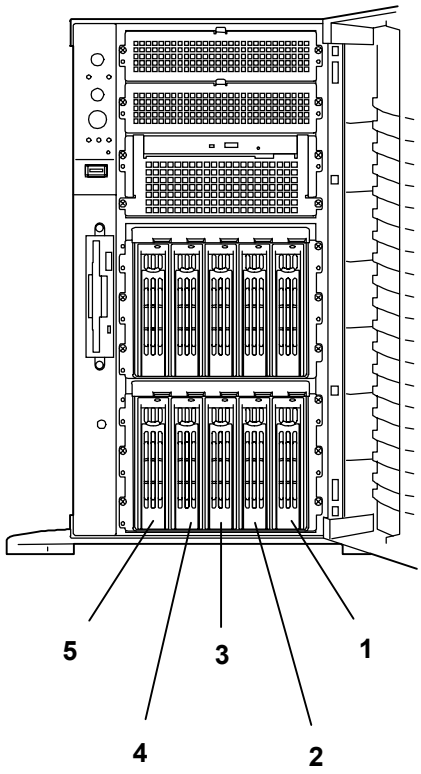


Figure 4-50. SCSI Disk Drive Installation Scheme

The suggested hard disk SCSI address assignment is:

Bay	Device	SCSI ID Address
1	First Hard Disk (Right)	8
2	Second Hard Disk	9
3	Third Hard Disk	10
4	Fourth Hard Disk	11
5	Fifth Hard Disk (Left)	12

Install the upgrade kit as follows:

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. Remove the left-hand side access panel as described earlier in this chapter.
4. Remove the fan cover as described earlier in this chapter.
5. Release the two disk carrier trays and dummy panel located at the bottom of the cabinet where the hard disk drive cage is to be installed. They are released by removing the two screws holding them in place. See Figure 4-51. Save the trays, panel, and screws for future use.

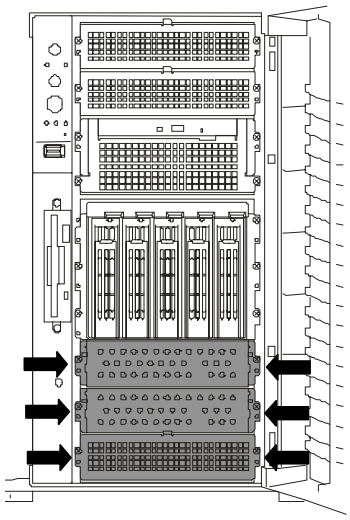


Figure 4-51. Releasing the Disk Carrier Trays and Dummy Panel

6. Slide the new HDD cage into the chassis, approximately half way. This will allow the interface cable to be connected easily. See Figure 4-52.

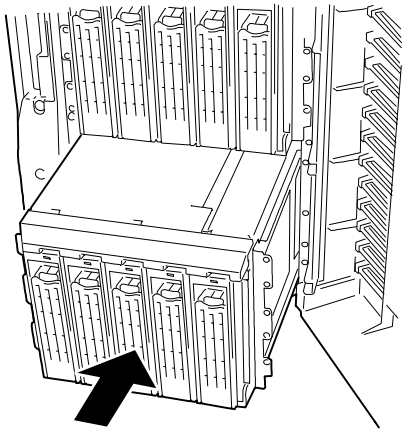
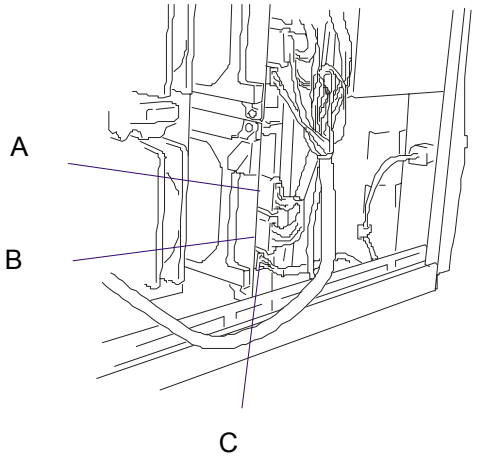


Figure 4-52. Installing the HDD Cage

7. Install the two-way SCSI cable or SCSI cable from the SCSI connector on the system board to the SCSI connector on the rear of the HDD cage.
8. Attach the two power cable connectors to connectors P10 and P11 on the HDD cage. See Figure 4-53.
9. Install the hot-swap backplane (HSBP) cable from the HSBP-B connector on the system board to its connector on the HDD cage. See Figure 4-53.



A	P11 cable connector
B	P10 cable connector
C	Hot-swap backplane (HSBP) cable connector (4-pin)

Figure 4-53. Attaching the Power and HSBP Cable Connectors

10. Slide the new HDD cage all the way into the chassis and secure the cage to the chassis using five screws provided with the upgrade kit. See Figure 4-54

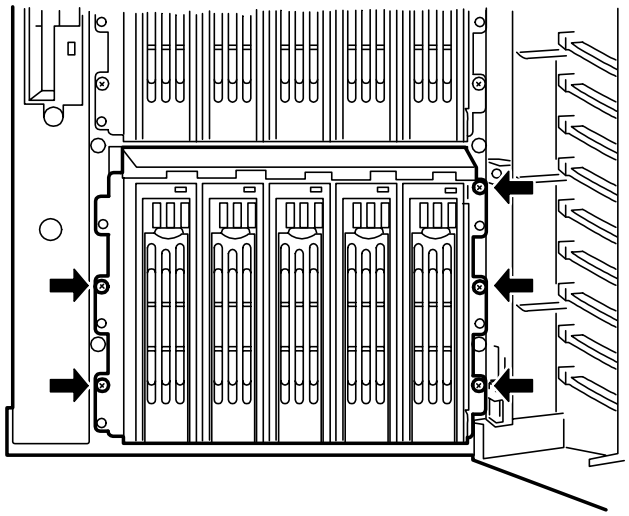


Figure 4-54. Securing the HDD Cage

11. Reinstall the fan cover. See Installing the Fan Cover described earlier in this chapter.
12. Reinstall the left-hand side access panel on the system chassis. See *Installing the Side Access Panel* earlier in this chapter.
13. Install hard disk drives into the HDD cage as previously described in this section.
14. Plug in the system power cord(s), and turn on the system.

Installing the Optional Hot-Swap Power Supply

The addition of a second hot-swap power supply makes your system so that it has redundant power and can be operated continuously without interruption if either of the power supplies malfunction.

To install the optional hot-swap power supply, perform the following procedures:

1. Observe the safety and ESD precautions listed under *General Information* and *Static Precautions* at the beginning of this chapter.
2. Prepare your system for upgrade. See *Preparing Your System for Upgrade* described earlier in this chapter.
3. At the rear of the cabinet locate the power supply bay, which has a blank cover over the front of the bay, where the optional power supply will be installed. See Figure 4-55.
4. Remove the blank cover by grasping its handle (1) with your right hand, press the latch with your index finger, pull the handle down slightly (2), and slide the cover out of the bay (3). Save the blank cover for future use.

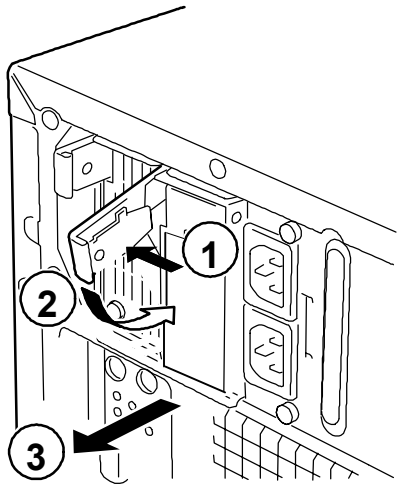


Figure 4-55. Removing the Blank Cover

5. Slide the new power supply into the bay until its latch clicks into place. See Figure 4-56.

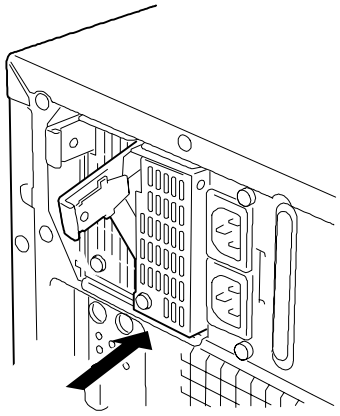
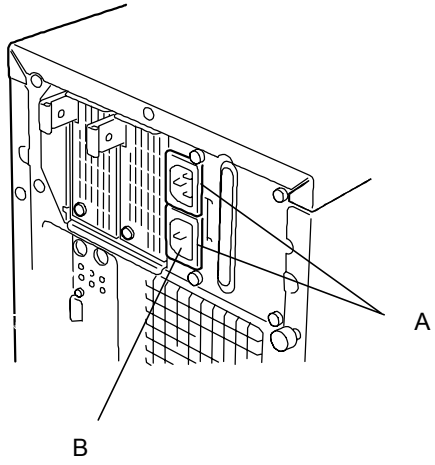


Figure 4-56. Installing the Power Supply

6. Using pliers remove the dust cover from the second AC inlet. See Figure 4-57.



A	AC inlets
B	Dust Cover

Figure 4-57. Removing the AC Outlet Dust Cover

7. Reconnect all the I/O cables connected to the rear panel of your system.
8. Plug in the system AC power cord(s) and turn on the system. See Figure 4-58.

> ***Note:*** When the AC power cords are connected to the power supplies, the status LED panel indicator on each of the power supplies will blink.

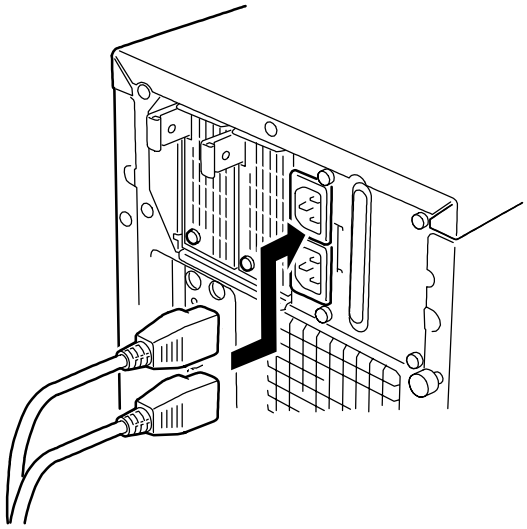


Figure 4-58. Plugging in the AC Power Cords

9. Power up the system and close the front door. When the system power is on the status LED panel indicator on each power supply goes to steady green indicating that the DC power is on and OK.

Hot-Swapping a Power Supply

Your system power is hot swappable only if your system is equipped with two power supplies. If a supply malfunctions it is hot swappable.

When you are swapping out a faulty power supply, you can determine which one to remove by checking the status LED panel indicator on each supply. If the LED panel indicator on a power supply is lit amber (failure) the power supply can be hot-swapped.

If your system is equipped with only one power supply, it is not hot swappable and it is recommended that power to the system be turned off before removing the power supply.

To hot-swap a power supply, perform the following steps:

1. At the rear of the cabinet locate the defective power supply. If the LED panel indicator on a power supply is lit amber the power supply is defective.
2. Remove the power supply by grasping its handle (1) with your right hand, press the latch with your index finger, pull the handle down slightly (2), and slide the power supply out of the bay (3). See Figure 4-59.

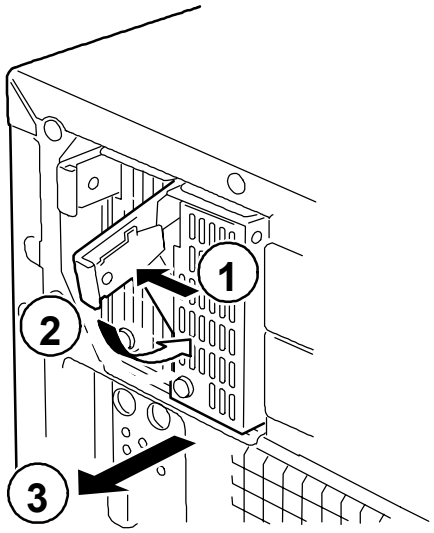


Figure 4-59. Removing a Power Supply

3. Slide the new power supply into the bay until its latch clicks into place. See Figure 4-60.

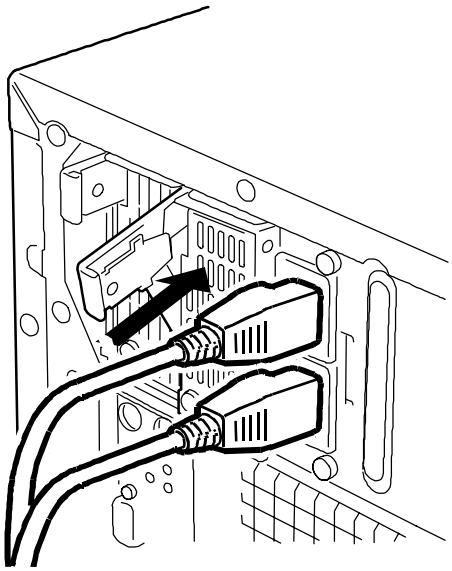


Figure 4-60. Installing a Power Supply

5

Problem Solving

- Problem Solving
- Static Precautions
- Troubleshooting Checklists
- Diagnostic Procedures
- Specific Problems and Corrective Actions
- Problems with the Network
- Plug and Play Installation Tips
- Error Messages
- How to Identify BIOS and BMC Revision Levels

Problem Solving

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last section includes BIOS, system, and disk status user information.

⚠ WARNING

The DC push-button on/off switch on the front panel does not turn off the system AC power. Also, +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage

⚠ CAUTION

Operating your system with the side cover removed can damage your system components. For proper cooling and airflow, always replace the top panel before powering on your system.

Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

Troubleshooting Checklists

The following subsections provide troubleshooting checklists for problems that occur at initial system startup, when you run new application software, and after the system hardware and software have been running correctly.

Initial System Startup

Incorrect installation or configuration usually causes problems that occur at initial system startup. Hardware failure is a less frequent cause. If you have problems during initial system startup, check the following:

- Are the system power cords properly connected to the system and plugged into a NEMA 5-15R outlet (100-120 Vac), a NEMA 6-15R outlet (200-240 Vac), or an UPS that meets the power specifications of the system?
- Is AC power available at the wall outlet?
- Is the power on/off push-button switch on the front panel in the ON position (power on LED should be lit)?
- Are all cables correctly connected and secured?
- Are all the PCI option boards fully seated in their connector slots on the system board?
- Are all jumpers and switch settings on option boards and peripheral devices correct? If applicable, ensure that there are no conflicts; for example, two option boards sharing the same interrupt.
- Are the processors fully seated in their slots on the system board? Refer to the *Processors* subsection of *Upgrading Your System* in chapter 4 for installation instructions?
- Are all DIMMs fully seated and installed correctly? Refer to the *DIMMs* subsection of *Upgrading Your System* in chapter 4 for installation instructions.
- Are all option boards and disk drives installed correctly? Refer to the *Options Boards* and *Hard Disk Drives* subsections of *Upgrading Your System* in chapter 4 for installation instructions.
- Is the system hard disk drive properly formatted or defined?
- Is the operating system properly loaded? Refer to the operating system documentation.
- Are all drivers properly installed? For information about installing drivers, refer to your *Network Operating System Configuration Guide*.
- Are the configuration settings in BIOS Setup and the SCSISelect Utility correct? For information about running these utilities, refer to the *Configuring Your System* chapter 3.

If the above items are all correct, but the problem reoccurs, refer to *Additional Troubleshooting Procedures* in this chapter.

Running New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. If you have problems while running new application software, check the following:

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorized copy? Unauthorized copies often do not work. Obtain an authorized copy of the software.
- If you are running the software from a hard disk drive, is the software correctly installed? Where all necessary procedures followed and files installed?
- If you are running the software from a CD-ROM disk is the disk scratched or dirty?
- Are the correct device drivers installed?
- Is the software correctly configured for the system?
- Are you using the software correctly?
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problems persist with the software, contact the software vendor's customer service representative.

After System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. However, many situations that are easy to correct can also cause such problems. If you have problems after the system has been running correctly, check the following:

- If you are running the software from a CD-ROM, try a new copy of the software.
- If the problem recurs, you may need to reformat the hard disk drive. The hard disk drive, the drive controller, or the system board set may be defective.
- If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), a marginal power supply, or other random component failures.
- If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands.

> ***Note:*** Voltage spikes can corrupt or destroy data files on the drive. If you are experiencing voltage spikes on the power line, install a surge suppresser between the power outlet and the system power cord.

If the problem recurs after you have checked and corrected all of the above items, refer to *Diagnostic Procedures* in this chapter.

Diagnostic Procedures

This section provides a more detailed approach to diagnosing and identifying problems and then locating their sources.

Error Checking

Each time you turn on the system, POST (Power-On-Self-Test) runs automatically and checks the system board, processors, memory board, keyboard, and mouse.

If POST finds an error, it displays an error message. Refer to the *Error Message* section in this chapter for an explanation of each error message.

Troubleshooting Guide

Use the following troubleshooting procedures to help you identify a problem. These general procedures lead you through the following:

- Preparing the system for diagnosing problems
- Monitoring POST while it is running
- Verifying proper operation of key system LEDs
- Confirming loading of the operating system.

Preparing the System for Diagnosing Problems

To prepare the system for diagnosing problems, perform the following:

> ***Note:*** Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all devices from the system except the keyboard and video monitor.
2. Make sure the system power cords are plugged into a properly grounded AC outlet.
3. Make sure your video display monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges (refer to the documentation supplied with your video display monitor).
4. If the operating system normally loads from the hard disk drive, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.
5. Turn on the system. If the power indicator LED does not light, refer to *Power Light Does Not Light* found later in this chapter.

Monitoring POST

Each time you turn on the system, the Power-On Self-Test (POST) runs automatically and checks the system board, processors, memory board, keyboard, and mouse.

During the memory test, POST displays the amount of memory that it is able to access and test. Depending on the amount of memory, it may take several minutes to complete the memory test. When the memory test completes, the following is displayed:

Press <F2> to enter SETUP

Press <**F2**> to enter BIOS SETUP. When the utility appears, follow the instructions on your monitor to configure BIOS. See chapter 3, "Configuring Your System." If you do not press <**F2>**, the above message remains for a few seconds and the boot process continues.

When this message appears:

Press <Ctrl> <A> for SCSISelect™ Utility!

Press <**Ctrl+A**> if you want to configure SCSI devices in your system. When the utility appears, follow the instructions on your monitor to configure the SCSI host adapter settings and run the SCSI disk utilities. See chapter3, *Configuring Your System*. If you choose not to run SCSISelect™ Utility, the boot process continues.

If POST finds an error, it displays an error message and, in case there is a problem with the display, it emits a series of long and short beeps. Write down any beep code emitted. This information is useful to your service representative.

Refer to the "Error Messages" section in this chapter for a list of items to check for each error code and for an explanation of the error beep codes.

The POST Tests table at the end of this chapter lists keys active during POST and provides a description of errors that may occur.

The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Report any error code to your service representative.

POST Keys and Errors

Action/Message	Description
If POST Beeps Before Video Appears	Initialization failed before video initialized. Most beep code errors are fatal; initialization cannot continue. Refer to the section "Error Messages" in this chapter.
If Monitor Displays Error	Note error; press **F1** to continue boot or **F2** to enter Setup. Refer to the section "Error Messages" in this chapter.
To Enter Setup	Setup changes specific options, then writes to CMOS, NVRAM. Press **F2** during initialization to run Setup. If you do not press **F2**, the boot process continues.
Enter BOOT Diskette	If prompted, insert the boot diskette.

Verifying Proper Operation of Key System Indicators

As POST determines the system configuration, it tests for the presence of each mass storage device installed in the system. As each device is checked, its activity indicator should turn on briefly. Check for the following:

- Does the diskette drive activity indicator turn on briefly? If not, refer to "Diskette Drive Activity Indicator Does Not Light" in this chapter.
- If there is a hard disk drive or SCSI devices installed in the system, does the hard disk drive activity indicator turn on briefly? If not, refer to *Hard Disk Drive Activity Indicator Does Not Light* in this chapter.

Confirming Loading of the Operating System

Once the system boots up, the operating system prompt appears on the screen. The prompt varies according to the operating system. If the operating system prompt does not appear, refer to *Problems with Application Software* found later in this chapter.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power LED does not light
- No beep or incorrect beep pattern
- No characters appear on screen
- Characters on the screen appear distorted or incorrect
- System cooling fan does not rotate
- Diskette drive activity LED does not light
- Hard disk drive activity LED does not light
- CD-ROM drive activity LED does not light
- Problems with application software
- The startup prompt “Press <F2> key if you want to run Setup” does not appear on the screen.
- The bootable CD-ROM is not detected.

Try the solutions in the order given. If you cannot correct the problem, contact your service representative for assistance.

Power LED Does Not Light

Check the following:

- Is the system operating normally? If so, the power LED is probably defective.
- Are there other problems with the system? If so, check the items listed under System Cooling Fans Do Not Rotate.

Incorrect or No Beep Code

Check the following:

- Is the speaker or buzzer operating?

If the system operates normally, but there was no beep, the speaker or buzzer may be defective, contact your service representative for assistance.

Record the beep code emitted by POST, and see the “Messages and Beep Codes” section found later in this chapter.

No Characters Appear on Screen

Check the following:

- Is the keyboard working? Check to see if the **Num Lock** light is functioning.
- Is the video display monitor plugged in and turned on?
- Are the brightness and contrast controls on the video monitor properly adjusted?
- Are the video monitor switch settings correct?
- Is the video monitor signal cable properly installed?
- Is the onboard video controller enabled?

If you are using a video controller board, verify that the video controller board is fully seated in the its connector.

If there are still no characters on the screen after you reboot the system, contact your service representative or authorized dealer for assistance.

POST emits one long beep and two short beeps pattern to indicate a possible problem with the video display controller. If you do not receive a beep pattern and characters do not display, the video display or video controller may have failed. Contact your service representative or authorized dealer for assistance.

Characters are Distorted or Incorrect

Check the following:

- Are the brightness and contrast controls properly adjusted on the video display? Refer to the documentation supplied with your video display.
- Are the video monitor's signal and power cables properly installed?
- If the problem persists, the video monitor may be faulty or it may be the incorrect type. Contact your service representative for assistance.

System Cooling Fans Do Not Rotate

> ***Note:*** In addition to the cooling fans that are an integral part of each power supply, the server chassis has front and rear cooling fans. There are no serviceable components inside the power supply. If the power supply is opened, the manufacturer's warranty is voided.

Check the following:

- Is AC power available at the wall outlet?
- Are the system power cords properly connected to the power supplies and the AC wall outlets?
- Are the cooling fans power connectors seated properly?
- Is the front panel power on indicator lit?

If the switches and connections are correct and the power outlet is functioning, the power supply has probably failed. Contact your service representative for assistance.

Diskette Drive Activity LED Does Not Light

Check the following:

- Are the diskette drive's power and signal cables properly installed?
- Is the diskette drive properly configured?
- Is the diskette drive activity light always on? If so, the signal cable may be plugged in incorrectly.

Use BIOS Setup to make sure that the diskette drive controller is set to Enabled. For information about running BIOS Setup, refer to the *Configuring Your System* chapter.

If the problem persists, there may be a problem with the diskette drive, system board, or drive signal cable. Contact your service representative for assistance.

CD-ROM Drive Activity Light Does Not Light

Check the following:

- Is the power and signal cable to the CD-ROM drive properly installed?
- Is the drive properly configured?
- Is the onboard IDE controller enabled?

Problems with Application Software

If you have problems with application software, perform the following:

- Verify that the software is properly configured for the system. Refer to the software installation and operation documentation for instructions on setting up and using the software.
- Verify a different copy of the software to see if the problem is with the copy that you are using.
- Make sure all cables are installed correctly.
- Verify that the system board jumpers are set correctly. Refer to the *Configuring Your System* chapter for jumper settings.
- If other software runs correctly on the system, contact your vendor about the failing software.

If the problem persists, contact the software vendor's customer service representative for assistance.

Bootable CD-ROM Is Not Detected

Check the following:

- Is the BIOS set to allow the CD-ROM to be the first bootable device after the diskette? Check your BIOS Setup (F2) configuration.

Problems with the Network

Diagnostics pass, but the connection fails:

- Make sure the network cable is securely attached.

The controller stopped working when an add-in adapter was installed:

- Make sure the cable is connected to the port from the onboard network controller.
- Make sure the other adapter supports shared interrupts. Also, make sure your operating system supports shared interrupts; OS/2 does not.
- Try reseating the add-in adapter.

The add-in adapter stopped working without apparent cause.

- Try reseating the adapter first; then try a different slot if necessary.
- The network driver files may be corrupt or deleted. Delete and then reinstall the drivers.
- Run the diagnostics.

Plug and Play Installation Tips

Certain drivers may require interrupts that are not shared with other PCI drivers. The BIOS Setup Utility can be used to adjust the interrupt numbers for PCI devices. For certain drivers, it may be necessary to alter settings so that interrupts are not shared.

Error Messages

This section describes the POST error codes and messages.

POST Error Codes and Messages

Whenever a recoverable error occurs during POST, BIOS displays a message on the video display screen and causes the speaker or buzzer to beep as the message appears. BIOS also issues a beep code during POST if the video configuration fails or if an external ROM module does not a checksum of zero. The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

Table 5-1 *POST Error Codes and Messages* is a list of the error codes and messages written at the start of each POST test. Table 5-2 *POST Error Beep Codes* is a list of beep codes issued for each POST test. The devices associated with the POST error codes are shown in subsection *POST Error Code Hardware References* that follow.

Table 5-1. POST Error Codes and Messages

Error Code and Message		Description	Action
0200	Hard Disk Failure	Hard disk failure.	Call your service representative
0210	Stuck Key	Keyboard connection error.	Disconnect and reconnect the keyboard. If the same error still occurs, call your service representative.
0211	Keyboard Error	Keyboard error.	This is not an error, when booting the system with the keyboard disconnected. Disconnect and reconnect the keyboard. If the same error still occurs, call your service representative.
0212	Keyboard Controller Failed	Keyboard controller error.	Disconnect and reconnect the keyboard. If the same error still occurs, call your service representative.
0213	Keyboard Locked - Unlock Key Switch	Keyboard is locked.	Disconnect and reconnect the keyboard. If the same error still occurs, call your service representative.
0220	Monitor Type does not match CMOS.	The monitor type is not consistent with CMOS data entered during system setup.	Check monitor parameters entered during system setup. If the same error still occurs, call your service representative.
0230	System RAM Failed at offset	System RAM error.	Contact your service representative to replace the system board or DIMM board.
0231	Shadow RAM Failed at offset.	Shadow RAM error.	

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0232	Extended RAM Failed at address line.	Extended RAM error	Contact your service representative to replace the system board or DIMM board.
0250	System Battery is Dead - Replace and Run SETUP.	No battery is available for the system.	Contact your service representative to replace the battery. (After battery is replaced, start the SETUP utility to set required values again.)
0251	System CMOS Checksum Bad - Default Configuration Used	Checksum of system CMOS is not correct.	The default values were set. Start the SETUP utility to set required values again. If the same error still occurs, call your service representative.
0252	Password checksum bad. Passwords cleared.	The passwords have been cleared.	Start the SETUP to provide password settings again.
0260	System Timer Error.	System timer error.	Contact your service representative.
0270	Real Time Clock Error.	Real-time clock error.	Contact your service representative.
0271	Check date and time setting.	Real-time clock is set incorrectly.	Start the SETUP utility and select [Main] → [System Time] → [System Date] to set the correct time. If the same error reoccurs, contact your service representative.
0281	Memory Size found by POST deferred from EISA CMOS.	Memory size error.	Contact your service representative.
02B0	Diskette drive A error.	Floppy disk A error.	Start the SETUP utility and select [Main] → [Diskette A] to set the required value again. Check if the floppy drive cable is correctly connected. If the error persists, contact your service representative to replace the cable or floppy disk drive.
02B1	Diskette drive B error.	Floppy disk B error.	
02B2	Incorrect Drive A type - run SETUP.	The type of drive A is incorrect.	Start the SETUP utility to set required values again. If the error persists, contact your service representative to replace the cable and/or drive.
02B3	Incorrect Drive B type - run SETUP.	The type of drive B is incorrect.	
02D0	System Cache error - Cache disabled.	System cache error - Cache disabled. The cache cannot be used.	Contact your service representative.
02D1	System Memory exceeds the CPU's caching limit.	System Memory exceeds the CPU's caching limit.	
02F4	EISA CMOS not write enabled.		Contact your service representative.
02F5	DMA test failed.		
02F6	Software NMI failed.		
02F7	Fail-safe timer NMI failed.		

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0611	IDE configuration changed.		Contact your service representative.
0612	IDE configuration error-device disabled.		
0613	COM A configuration changed.		
0614	COM A configuration error – device disabled.		
0615	COM B configuration changed.		
0616	COM B configuration error – device disabled.		
0617	Floppy configuration changed.		
0618	Floppy configuration – device disabled.		
0619	Parallel port configuration changed.		
061A	Parallel port configuration error – device disabled.		
0B00	Rebooted during BIOS boot at Post Code.		
0B01	Rebooted during OS boot.		
0B02	Rebooted during OS runtime.		
0B1B	PCI system error on Bus/Device/Function		
0B1C	PCI parity error on Bus/Device/Function		
OB22	Processors are installed out of order.		
0B28	Unsupported CPU detect on CPU slot 1	Unsupported CPU (old version) is mounted in CPU slot.	Contact your service representative to replace the failed CPU (number).
0B29	Unsupported CPU detect on CPU slot 2	Unsupported CPU (old version) is mounted in CPU slot.	Contact your service representative to replace the failed CPU (number).
0B30 | 0B35	Fan Alarm 1 – 6 occurred.	Fan error	Contact your service representative to replace the faulty fan indicated in the system event log.

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0B50	CPU #1 with error taken off line.	Because an error was detected in CPU #1, it was degraded.	The displayed CPU is degraded. Contact your service representative to replace the failed CPU.
0B51	CPU #2 with error taken off line.	Because an error was detected in CPU #2, it was degraded.	
0B5F	Forced to use CPU with error.	CPU error is detected.	The system is started forcibly because errors are detected on all CPUs. Contact your service representative to replace the CPU.
0B60	DIMM group #1 has been disabled.	A memory error was detected in memory DIMM group #1. Memory DIMM group #1 is degraded.	Contact your service representative to replace the DIMM board.
0B61	DIMM group #2 has been disabled.	A memory error was detected in memory DIMM group #2. Memory DIMM group #2 is degraded.	
0B62	DIMM group #3 has been disabled.	A memory error was detected in memory DIMM group #3. Memory DIMM group #3 is degraded.	
0B70	The error occurred during temperature sensor reading.	An error was detected in the middle of detection of abnormal temperature.	Contact your service representative.
0B71	System Temperature out of the range.	Abnormal temperature was detected.	
0B74	The error occurred during voltage sensor reading.	An error occurred during detection of voltage.	
0B75	System Voltage out of the range.	Abnormal system voltage was detected.	
0B78	The error occurred during fan sensor reading.	An error was detected during read of FAN sensor.	

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0B7C	The error occurred during the redundant power module confirmation.	An error occurred while redundant power supply was configured.	Contact your service representative to replace the power unit.
0B7D	The normal operation can not be guaranteed with use of only one PSU.	System is running on only one power supply.	Contact your service representative to replace the power unit.
0B80	BMC Memory Test Failed.	BMC SRAM test error	Shutdown and restart the server. If the error cannot be corrected, contact your service representative.
0B81	BMC Firmware Code Area CRC check failed.	CRC error occurred in BMC code area.	
0B82	BMC Core Hardware Failure.	Hardware failure occurred in BMC.	
0B83	BMC 1BF or 0BF check failed.	Possible BMC errors.	
0B8A	BMC SEL area full		
0B8B	BMC progress check timeout.		
0B8C	BMC command access failed.		
0B8D	Could not redirect the console-BMC busy.		
0B8E	Could not redirect the console-BMC error.		
0B8F	Could not redirect the console-BMC parity error.		
0B90	BMC Platform Information Area Corrupted.	The platform information area of BMC is damaged.	
0B91	BMC update firmware corrupted.	Possible BMC errors.	
0B92	Internal use area of BMC FRU corrupted.	Possible BMC errors.	All the commands and functions other than the FRU command and the EMP function can be used. This is not a fatal error. Turn off the power once and then on again to restart the server. If the error cannot be corrected, contact your service representative.
0B93	BMC SDR Repository empty.	No BMC SDR data exists.	Turn off the power once and then on again to restart the server. If the error cannot be corrected, contact your service representative.

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0B94	IPMB signal lines not reponding.		All the functions other than the function of accessing to SMC through IPMB can be used. This is not a fatal error. Turn off the power once and then on again to restart the server. If the error cannot be corrected, contact your service representative.
0B95	BMC FRU device failure.	Access to SROM that contains the chassis information failed.	All the commands and functions other than the FRU command and the EMP function can be used. This is not a fatal error. Turn off the power once and then on again to restart the server. If the error cannot be corrected, contact your service representative.
0B96	BMC SDR Repository failure.	Access to FMEM sector that contains SDR information failed.	Turn off the power once and then on again to restart the server. If the error cannot be corrected, contact your service representative.
0B97	BMC SEL device failure.	Possible BMC errors.	
0B98	BMC RAM test error.		
0B99	BMC Fatal hardware error.		
0B9A	Management controller not responding.		
0B9B	Private I2C bus not responding.		
0B9C	BMC internal exception.		
0B9D	BMC A/D timeout error.		
0B9E	SDR repository corrupt.		
0B9F	SEL corrupt.		
0BB0	SMBIOS - SROM data read error.	Read error of SROM data.	
0BB1	SMBIOS - SROM data checksum bad	Checksum for the SROM data is incorrect.	Contact your service representative to replace the failed CPU.
0BC0	POST detected startup failure of CPU #1.	CPU #1 failed to startup.	
0BC1	POST detected startup failure of CPU #2.	CPU #2 failed to startup.	

Table 5-3. POST Error Codes and Messages (continued)

Error Code and Message		Description	Action
0BD0	1st SMBus device address not acknowledged.	No response was made to the access to the 1st SMBus.	Contact your service representative to replace the board indicated in the system event log.
0BD1	1st SMBus device Error detected.	An error was detected in the access to the 1st SMBus.	
0BD2	1st SMBus timeout.	A timeout error occurred in the access to the 1st SMBus.	
0BD3	2nd SMBus device address not acknowledged.	No response was made to the access to the 2nd SMBus.	
0BD4	2nd SMBus device Error detected.	An error was detected in the access to the 2nd SMBus.	
0BD5	2nd SMBus timeout.	A timeout error occurred in the access to the 2nd SMBus.	
0BD6	3rd SMBus device address not acknowledged.	No response was made to the access to the 3rd SMBus.	
0BD7	3rd SMBus device Error detected.	An error was detected in the access to the 3rd SMBus.	
0BD8	3rd SMBus timeout.	A timeout error occurred in the access to the 3rd SMBus.	
0BD9	4th SMBus device address not acknowledged.	No response was made to the access to the 4th SMBus.	
0BDA	4th SMBus device Error detected.	An error was detected in the access to the 4th SMBus.	
0BDB	4th SMBus timeout.	A timeout error occurred in the access to the 4th SMBus.	
0BDC	5th SMBus device address not acknowledged.	No response was made to the access to the 5th SMBus.	
0BDD	5th SMBus device Error detected.	An error was detected in the access to the 5th SMBus.	
0BDE	5th SMBus timeout.	A timeout error occurred in the access to the 5th SMBus.	
0BE8	IPMB device address not acknowledged.	IPMB error	Contact your service representative.
0BE9	IPMB device error detected.		
OBEA	IPMB timeout.		

Table 5-3. POST Error Codes and Messages (continued)

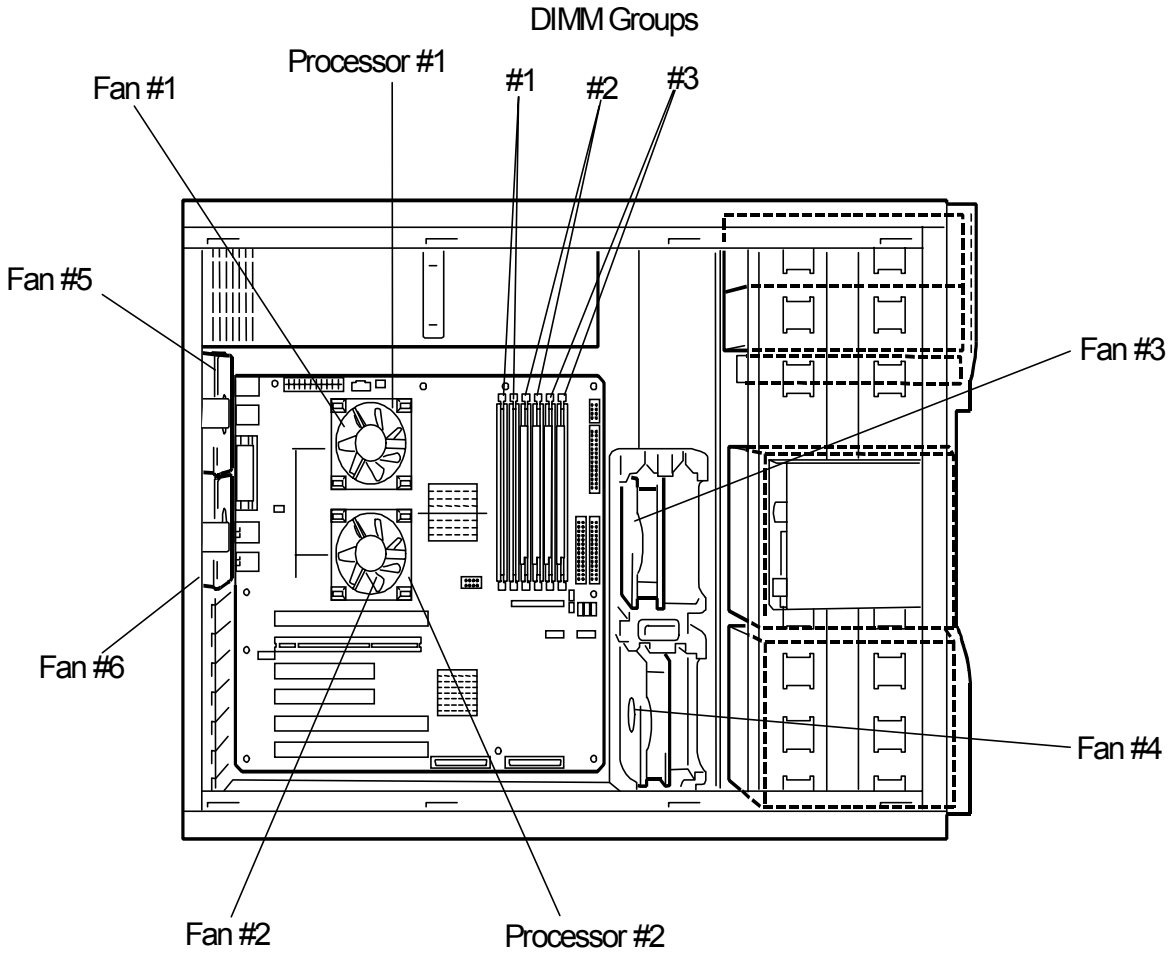
Error Code and Message		Description	Action
0BE8	IPMB device address not acknowledged.	IPMB errors.	Contact your service representative.
0BE9	IPMB device error detected.		
OBEA	IPMB timeout.		
8100	Memory Error detected in DIMM group #1.	Memory DIMM errors	Contact your service representative to replace the two DIMMs in the relevant group.
8101	Memory Error detected in DIMM group #2.		
8102	Memory Error detected in DIMM group #3.		
8120	Unsupported DIMM detected in DIMM group #1.		
8121	Unsupported DIMM detected in DIMM group #2.		
8122	Unsupported DIMM detected in DIMM group #3.		
8130	Mismatch DIMM detected in DIMM group #1.		See the labels put on the DIMMs to make sure that the DIMMs of the same type are installed in groups. If DIMMs of different types are installed in one or more groups, contact the service representative to replace DIMMs properly.
8131	Mismatch DIMM detected in DIMM group #2.		
8132	Mismatch DIMM detected in DIMM group #3.		
8140	DIMM group #1 with error is enabled.		Contact your service representative to replace the two DIMMs in the relevant group.
8141	DIMM group #2 with error is enabled.		
8142	DIMM group #3 with error is enabled.		
8150	NVRAM Cleared By Jumper.	NVRAM clear.	Turn off the power. Then change the jumper to the original setting.
8160	Mismatch Processor Speed detected on Processor 1.	Processor mismatch.	Check the frequency of the CPU. If it is unknown, contact your service representative.
8161	Mismatch Processor Speed detected on Processor 2.	Processor mismatch.	

Table 5-2. Post Error Beep Codes

Beeps	Error	Recommended Action
1-2-2-3	ROM Checksum Error	Call your service representative.
1-3-1-1	DRAM Refresh Test Error	Check if memory DIMMs are installed correctly. If the same error still occurs, call your service representative.
1-3-1-3	Keyboard Controller Error	Check keyboard. If the same error still occurs, call your service representative.
1-3-3-1	Memory Not Detected or Incorrect DIMM Type	Check if memory DIMMs are installed correctly. Change memory DIMM's. If the same error still occurs, call your service representative.
1-3-4-3	All Memory Group Errors	Check if memory DIMMs are installed correctly. If the same error still occurs, call your service representative.
2-2-3-1	Illegal Interrupt Test Error	If the same error still occurs, call your service representative.
1-2	Video BIOS Initialization Error	If the same error still occurs, call your service representative.
1-2	Option ROM Initialization Error	If the same error still occurs, call your service representative.

POST Error Code Hardware References

The following hardware illustrations show the devices associated with the error codes that appear on the screen of the display unit as listed in Table 5-1.



How to Identify BIOS and BMC Revision Levels

To help you identify your system's current BIOS and BMC revision levels, refer to the following subsections..

BIOS Revision Level Identification

During system Power-On Self Test (POST), which runs automatically when your system is powered on, your system monitor displays several messages, one of which identifies the BIOS revision level currently loaded on your system, see the example below.

Example: BIOS Revision Level

```
Phoenix BIOS 4.0 Release 6.0.250A
```

In the example above, BIOS 6.0.250A is the current BIOS revision level loaded on your system.

> ***Note:*** The BIOS Revision Level stated in the example may not reflect the actual BIOS setting in your system.

BMC Revision Level Identification

During system Power-On Self Test (POST), which runs automatically when your system is powered on, system diagnostics are run. Following the memory test diagnostic, several messages will appear informing you that the mouse was detected and system configuration data updated, when you see these messages the BMC messages are displayed next.

> ***Note:*** In order to see the diagnostic messages, the ESC key must be pressed.

To identify your system's current BMC revision level, see the example below.

Example: BMC Messages

```
Base Board Management Controller

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Device ID          :01      Device Revision     :00
IPMI Version       :1.0     Firmware Revision   :00.60
Self Test Result   :
```

In the example above, Firmware Revision 00.60 is the current BMC revision level loaded on your system.

> ***Note:*** The Firmware Revision Level stated in the example may not reflect the actual BMC revision level setting in your system.

A

Technical Specifications

- Server Unit

This appendix provides the technical specifications for your server unit.

Server Unit

Table A-1 lists the server unit technical specifications.

Table A-1. Server Unit Technical Specifications

Item	Specification
Chassis	
Dimensions	Width: 12.8 inches (320 mm) Height: 18.0 inches (450 mm) Depth: 27.3 inches (683 mm)
Weight	Non-hot-swap system up to 40 lbs. (18 kg) Hot-swap system up to 77 lbs. (35 kg)
Enclosure	Tower or 19-inch rack mountable (5U)
Environment	Temperature: 50° to 95°F (10° to 35°C) Relative humidity: 20% to 80% (non-condensing)
Peripheral Interface (rear access)	PS/2 style (6-pin mini-DIN) keyboard connector PS/2 style (6-pin mini-DIN) mouse connector Four USB (4-pin) port connectors Two serial (9-pin) port connectors Parallel printer (25-pin) port connector Two RJ-45 10Base-T/100Base-TX Ethernet port connector SVGA (15-pin) port connector Ultra160 SCSI device (68-pin) port connector (option)
Option PCI Slots	Four 64-bit PCI bus (66 MHz) slots Two 32-bit PCI bus (33 MHz) slots
Storage Device Capacity	One CD-ROM drive One 3 1/2-inch floppy diskette drive Up to two 5 1/4-inch removable devices Five non-hot-swap SCSI HDD bays or five hot-swap HDD bays and five optional hot-swap HDD bays.
System Board	
Processor	Intel® Pentium® III Processor Clock rate: 1.0/1.26 GHz
Cache	256 KB/512 KB (L3)

Table A-1. Server Unit Technical Specifications (Continued)

Item	Specification
Optional Processor Support	Upgradeable from one to two processors
Chipset	ServerWorks ServerSet III HE-SL + CSB5
Graphics	ATI RAGE XL (4 MB VRAM) Resolutions: 640x480, 800x600, 1024x768, 1280x1024 Colors: 16 Meg @ 640x480/800x600 64K @ 1024x768 256 @ 1280x1024
Fast Ethernet Integrated On-board Controller	Dual Intel 82550 10BASE-T/100BASE-TX network controller with two RJ-45 Ethernet connectors
SCSI Controller	Embedded Adaptec AIC7899W dual function controller
Real-time Clock Battery	Lithium battery (vendor part no. CR2032)
Peripheral Controller	PC87417 (Super I/O) controller
Memory Board	Up to 6 GB of ECC SDRAM DIMM two way interleaved memory.
Keyboard	PS/2-compatibe 104-key 12 function keys separate numeric and cursor pads
Mouse	PS/2 mouse
Power Supply	Non-hot-swap system: 300 Watt power supply Hot-swap system: 350 Watt power supply (up to two)
System Power	AC input: 100 - 120VAC ±10% or 200 - 240VAC ±10%, 50/60 Hz ±1Hz Power consumption: 420 VA/410 Watts (hot-swap) 280 VA/275 Watts (non-hot-swap)

B

Connectors

- Overview
- External Device Connector Pin Information

Overview

This appendix provides pinout information about the server's external device connectors.

External Device Connector Pinout Information

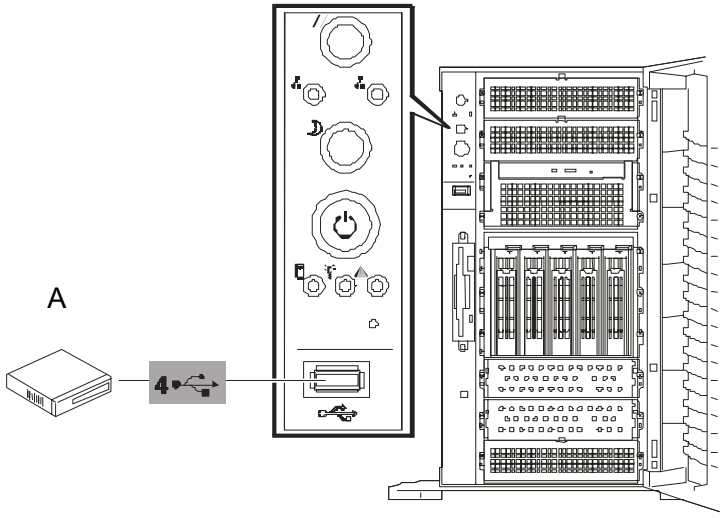
Pinout information for the following external device connectors that are located on the front and rear of the server unit is provided as follows.

Front of server (see Figure B-1 and Table B-3):

- USB port

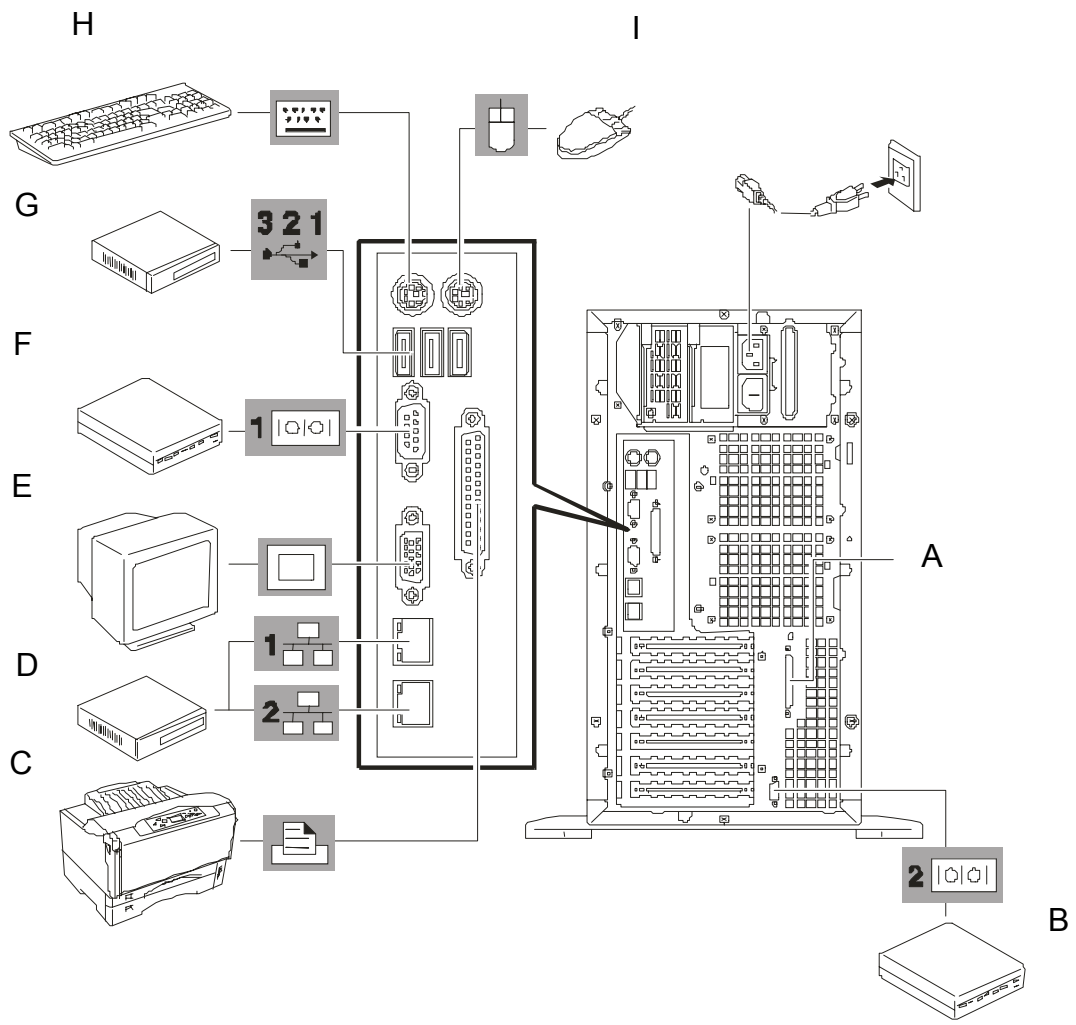
Rear of server (see Figure B-2):

- Keyboard and Mouse ports (see Table B-1)
- Serial ports COM1 and COM2 (see Table B-2)
- USB ports (see Table B-3)
- VGA video monitor port (see Table B-4)
- RJ45 LAN ports (see Table B-5)
- Parallel port (see Table B-6)
- External SCSI port



A	USB Port 4	USB Interface connector.

Figure B-1. Front External Device Connector Location



A	External SCSI Port*	External-SCSI, Ultra160-SCSI 68-pin connector.
B	Serial Port 2	Serial port 9-pin connector.
C	Parallel Port	Printer port, LPT1 25-pin parallel port connector
D	RJ45 LAN Ports 1 & 2	10Base-T/100Base-TX network LAN connector.
E	Video Monitor Port	Monitor, VGA video 15-pin connector.
F	Serial Port 1	Serial port 9-pin connector.
G	USB Ports 1, 2, & 3	USB Interface connectors.
H	Keyboard Port	Keyboard, PS/2-compatible 6-pin mini-DIN connector
I	Mouse Port	Mouse, PS/2-compatible 6-pin mini-DIN connector

* Not connected internally.

Figure B-2. Rear External Device Connector Locations

Keyboard and Mouse

Table B-1 lists the connector pinouts for the keyboard and mouse. The keyboard and mouse connectors are functionally equivalent.

Table B-1. Keyboard and Mouse Connector Pinouts

Pin	Keyboard signal	Pin	Mouse signal
1	KEYDAT	1	MSEDAT
2	NC	2	NC
3	GND	3	GND
4	FUSED_VCC (+5 V)	4	FUSED_VCC (+5 V)
5	KEYCLK	5	MSECLK
6	NC	6	NC

Serial Ports COM1 and COM2

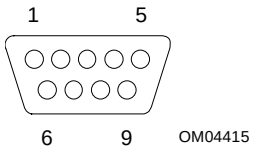


Table B-2 lists the connector pinouts for serial ports COM1 and COM2.

Table B-2. Serial Ports COM1 and COM2 Connector Pinouts

Pin	Signal	Description
1	DCD	Data carrier detected
2	RXD_L	Receive data
3	TXD_L	Transmit data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Return to send
8	CTS	Clear to send
9	RIA	Ring indication active

USB Ports

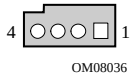


Table B-3 lists the connector pinouts for the four Universal Serial Bus (USB) ports.

Table B-3. USB Port Connector Pinouts

USB 0 Pin	Signal	USB 1 Pin	Signal	USB 2 Pin	Signal	USB 3 Pin	Signal
1	+5 VDC	1	+5 VDC	1	+5 VDC	1	+5 VDC
2	DataL0	2	DataL1	2	DataL2	2	DataL3
3	DataH0	3	DataH1	3	DataH2	3	DataH3
4	GND	4	GND	4	GND	4	GND

VGA Video Monitor Port

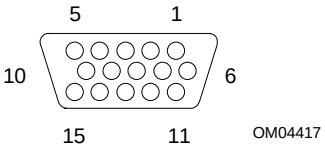


Table B-4 lists the connector pinouts for the VGA video monitor port.

Table B-4. VGA Video Monitor Port Connector Pinouts

Pin	Signal	Pin	Signal
1	Red	9	Fused VCC (+5V)
2	Green	10	GND
3	Blue	11	NC
4	NC	12	DDCDAT
5	GND	13	HSYNC
6	GND	14	VSYNC
7	GND	15	DDCCLK
8	GND		

RJ-45 LAN

Table B-5 lists the connector pinouts for the RJ-45 LAN ports.

Table B-5. RJ-45 LAN Connector Pinouts

Pin	Signal	Description
1	TX+	Transmit data plus—the positive signal for the TD differential pair contains the serial output data stream transmitted onto the network
2	TX-	Transmit data minus—the negative signal for the TD differential pair contains the same output as pin 1
3	RX+	Receive data plus—the positive signal for the RD differential pair contains the serial input data stream received from the network
4	NC	
5	NC	
6	RX-	Receive data minus—the negative signal for the RD differential pair contains the same input as pin 3
7	NC	
8	NC	

Parallel Port

Table B-6 lists the connector pinouts for the parallel port.

Table B-6. Parallel Port Connector Pinouts

Pin	Signal	Pin	Signal
1	STROBE_L	10	ACK_L
2	Data bit 0	11	Busy
3	Data bit 1	12	PAPER_END
4	Data bit 2	13	SELECT
5	Data bit 3	14	AUTOFD_L
6	Data bit 4	15	ERROR_L
7	Data bit 5	16	INIT_L
8	Data bit 6	17	SLCT_INPUT_L
9	Data bit 7	18–25	GND

Glossary

A

AC
(Alternating Current) The type of current available in wall outlets. All computers must convert alternating current to direct current to operate. See also DC.

address
A label, name, or number that identifies a location in computer memory.

ASCII
(American Standard Code for Information Interchange) A standard number assigned to each of the alphanumeric characters and keyboard control code keys to enable the transfer of information between different types of computers and peripherals.

B

backplane slot
A connector on the backplane board in desktop computers and expansion boxes that allows you to install circuit cards.

backup
A copy of data for safe-keeping. The data is copied from computer memory or disk to a floppy disk, magnetic tape, or other media.

backup battery
The battery in your computer that maintains the real-time clock and the configuration information when the computer's power is removed.

base memory
An area of memory between 0 and 640 kilobytes.

baud rate
The speed with which data is transmitted during serial communication. The computer's operating system and software program must be configured for the same baud rate as the communication device, such as a serial printer. See also bps.

BIOS
(Basic Input/Output System) A program stored in flash EPROM or ROM that controls the keyboard, disk drives, video monitor, and other devices. See also flash EPROM, EPROM, and ROM.

bit
Derived from BInary digiT, a bit is the smallest unit of information a computer handles. See also byte.

BMC
(Baseboard Management Controller) Contains all of the server management functions. One major function of the BMC is to monitor system management events and log their occurrence in the System Event Log (SEL).

boot
The process of loading the operating system into memory.

bps
(bits per second) The number of bits transferred in one second during serial communication, such as modem transmission.

byte
A group of eight bits.

C

cache memory
A very fast, limited portion of RAM set aside for temporary storage of data for direct access by the microprocessor.

CD-ROM drive
(Compact Disk ROM drive) A type of mass storage device that reads information from a compact disk.

Centronics port
An industry standard parallel port. See also parallel port.

CGA
(Color Graphics Adapter) A type of video display system that provides low-resolution text and graphics on TTL monochrome and color monitors.

CMOS
(Complimentary Metal-Oxide Semiconductor) A type of low-power integrated circuit used in computers. See also TTL.

COM1 or COM2
The name you can assign a serial port to set or change its address. See also serial port.

command
An instruction that directs the computer to perform a particular operation.

configuration
The way in which a computer is set up to operate. Some configurable options include CPU speed, serial port designation, and memory allocation.

coprocessor
See math coprocessor.

CPU
(Central Processing Unit) See microprocessor.

CRT
(Cathode-Ray Tube) The type of video display used in monitors for desktop computers.

D

DC
(Direct Current) The type of current available in the rechargeable battery packs used in portable computers. See also AC.

default
The factory setting your computer uses unless you instruct it otherwise. For example, when powering up, the computer will boot from the default drive.

density
The capacity of information (bytes) that can be packed onto a storage device, such as a floppy disk.

device driver
A software program that a computer must use to recognize and operate certain hardware, such as a mouse or a video monitor.

disk drive
A device that stores data on a hard or floppy disk. A floppy disk drive requires a floppy disk to be inserted; a hard disk drive has a permanently encased hard disk.

DOS
(Disk Operating System) See operating system.

DRAM
(Dynamic RAM) See RAM.

E

ECC
(Error Checking and Correction) A method of detecting and correcting errors.

EEPROM
(Electrically Erasable Programmable Read-Only Memory) A type of memory device that stores password and configuration information.

EGA
(Enhanced Graphics Adapter) A type of video display system that provides medium-resolution text and graphics on TTL monochrome, color, and enhanced color monitors.

EMP

The Emergency Management Port (EMP) provides an interface to the console manager. This interface allows remote server management via a modem or direct connection.

EMS

(Expanded Memory Specification) A method of accessing memory beyond the 640K limit of DOS by exchanging data in and out of main memory at high speeds. Some software requires EMS to operate.

EPROM

(Erasable Programmable Read-Only Memory) A type of memory device that is usually used to store system BIOS code. This code can be erased with ultraviolet light, but is not lost when the computer is powered off. See also flash EPROM and ROM.

expansion slot

See backplane slot.

extended memory

The protected memory above 1M that is directly accessible by the microprocessor through certain utilities and operating systems.

F

fault resilient boot (FRB)

Logic on the system board, controlled by the System Management Board Controller, that allows the system to continue to boot when system errors occur.

flash EPROM

A type of memory device that is usually used to store system BIOS code. This code can be replaced with updated code from a floppy disk, but is not lost when the computer is powered off. See also EPROM and ROM.

floppy disk drive

See disk drive.

format

The process used to organize a hard or floppy disk into sectors so it can accept data. Formatting destroys all previous data on the disk.

G

(Gigabyte)

1,073,741,824 bytes. See also byte.

H

hard disk drive
See disk drive.

hardware
The physical parts of your computer, including the keyboard, monitor, disk drives, cables, and circuit cards.

hot swap
A method used to insert or remove SCSI disk drives into or from an operating bus. This method is typically used in RAID subsystems. When used in non-RAID subsystems the operating system must typically be restarted.

I

IC
(Integrated Circuit) An electronic device that contains miniaturized circuitry.

IDE
(Integrated Drive Electronics) A type of hard disk drive with the control circuitry located inside the disk drive rather than on a drive controller card.

interface.
A connection between the computer and a peripheral device that enables them to exchange data. See also parallel port and serial port.

ISA
(Industry Standard Architecture) An industry standard for computers and circuit cards that transfer 16 bits of data at a time.

J

jumper
A small electrical connector used for configuration on some computer hardware.

K

(Kilobyte)
1,024 bytes. See also byte.

L

LAN
(Local Area Network) A group of computers linked together within a limited area to exchange information.

LCD
(Liquid Crystal Display) The type of video display used in portable computers.

LED
(Light-Emitting Diode) A small electronic device that glows when current flows through it.

LPT1 or LPT2
The name you can assign a parallel port to specify its address. See also parallel port.

LVD
Super-fast Ultra 2 SCSI Low Voltage Differential (LVD) Parallel SCSI Interface. A new SCSI interface that provides greater I/O bandwidth, device connectivity, data reliability, and longer cable lengths for Ultra2 SCSI hard disk drives. Note that in order to achieve LVD performance all devices including cable, controller, and drive must support LVD.

M

(Megabyte)
1,048,576 bytes. See also byte.

memory
The circuitry in your computer that stores data and programs. See also EMS, extended memory, RAM, and ROM.

microprocessor
The integrated circuit that processes data and controls the basic functions of the computer.

modem
A device used to exchange information with other computers over telephone or data lines.

module
A circuit board that plugs into a dedicated connector on the system board in your computer.

mouse
A small input device that you guide on a flat surface to control the cursor movement and operation of the computer when using certain software programs.

N

NVRAM
(Nonvolatile RAM) A type of RAM that retains its contents even after the computer is powered off. This memory stores EISA configuration information. See also RAM and SRAM.

O

operating system
A set of programs that provides the interface between other software programs and the computer.

P

parallel port
The connector on the back of your computer that allows the transfer of data between the computer and a parallel device, such as a parallel printer.

partition
The process of dividing the storage space on a hard disk into separate areas so that the operating system treats them as separate disk drives.

password
A security feature that prevents an unauthorized user from operating your computer. See also EEPROM.

PCI
Peripheral Component Interconnect. PCI is a high-performance peripherals I/O bus supporting data transfers of up to 528MB per second.

Pentium
A type of microprocessor, with a built-in math coprocessor, cache memory, and memory and bus controllers, that processes and communicates 32 bits of data at a time. This microprocessor also contains power management capabilities.

peripheral
A device connected to and controlled by the computer, such as an external disk drive or a printer.

pixel
The smallest element that is visible on a video display. The resolution of a video display system is measured in pixels.

PnP
(Plug-n-Play) Plug-and-play is the ability to plug a device into a computer and have the computer recognize that the device is there. The user doesn't have to tell the computer.

POST
Power-On-Self-Test.

R

RAM
(Random-Access Memory) A temporary storage area for data and programs. This type of memory must be periodically refreshed to maintain valid data, and is lost when the computer is powered off. See also NVRAM and SRAM.

real-time clock
The IC in your computer that maintains the time and date.

ROM
(Read-Only Memory) A type of memory device that usually is used to store system BIOS code. This code cannot be altered and is not lost when the computer is powered off. See also BIOS, EPROM, and flash EPROM.

RS-232C port
An industry standard serial port. See also serial port.

S

SAF-TE
(SCSI Accessed Fault Tolerant Enclosure) A specification for monitoring the state of the drives and enclosure environment (fan, power supply, temperature, etc.) using the SCSI bus to indicate faults.

save
To store information on a floppy disk, hard disk, magnetic tape, or some other permanent storage device.

SCSI
(Small Computer System Interface) An industry standard interface that provides high-speed access to tape drives, hard disk drives, and other peripheral devices.

SEL
(System Event Log) A record of system management events. The information stored includes the name of the event, the date and time the event occurred and data pertinent to the event. Event data may include POST error codes that reflect hardware errors or software conflicts within the system.

serial communication
Information sent sequentially, one bit at a time.

serial port
The connector on the back of your computer that allows the transfer of data between the computer and a serial device, such as a mouse, a modem, or a serial printer.

setup program
The program that you use to change the configuration of some ISA desktop and notebook computers. This program also contains information about the hardware in the computer.

software
Programs with specific functions, such as word processing, data base management, communications, and operating system.

SRAM
(Static RAM) A temporary storage area for data and programs. This type of memory does not need to be refreshed, but it is lost when the computer is powered off. See also NVRAM and RAM.

SVGA

(Super VGA) A type of video display system that provides very high-resolution text and graphics on analog color monitors.

system board

The main circuit board in your computer. It contains most of the connectors and ports.

T

tape drive

A type of storage device using magnetic tape.

TTL

(Transistor-Transistor Logic) A type of integrated circuit used in computers. See also CMOS.

U

ultra 160/m SCSI

Ultra 160/m is a parallel SCSI interface based on Ultra3 SCSI technology. This interface features data transfer speeds up to 160MB/second (double-edge clocking), cyclical redundancy checking (CRC) providing higher levels of data reliability, and domain validation that detects the configuration of the SCSI bus and automatically tests and adjusts the SCSI bus transfer rate to optimize interoperability. Note that the Ultra 160/m uses the standard Ultra2 LVD cabling and termination, making it backward compatible for easy implementation.

V

VGA

(Video Graphics Array) A type of video display system that provides high-resolution text and graphics on analog color monitors.

Equipment Log

Use this equipment log form to record pertinent information about your system. You will need some of this information to run the System Setup Utility. Be sure to update the equipment log when you add options.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the name of the vendor from whom the component was purchased. Be sure to record the same information for any components added to the system, such as a power supply, hard disk drives, add-in boards, or printers.

Record the model and serial numbers of the unit and system baseboard. The model and serial numbers of the system unit are recorded on a label attached to the rear of the unit. The serial number of the system board is located along the left side of the board, near the PCI expansion slot covers.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another. Literature accompanying these products should illustrate or describe the location of model and serial numbers.

Component	Manufacturer Name & Model	Serial Number (if available)	Date Installed
Server			
System Board			
Processor 1			
Processor 2			
DIMM Slot 1			
DIMM Slot 2			
DIMM Slot 3			
DIMM Slot 4			
DIMM Slot 5			
DIMM Slot 6			
CD-ROM Drive			
Diskette Drive			
Additional 5.25-Inch Peripheral			
Additional 5.25-Inch Peripheral			
Hard Disk Drive 1			
Hard Disk Drive 2			
Hard Disk Drive 3			
Hard Disk Drive 4			
Hard Disk Drive 5			
Optional Hard Disk Drive 1			
Optional Hard Disk Drive 2			
Optional Hard Disk Drive 3			
Optional Hard Disk Drive 4			
Optional Hard Disk Drive 5			
Optional RAID Controller			
Monitor			
Keyboard			
Mouse			
External Peripheral 1			
External Peripheral 2			
300-Watt Power Supply			
350-Watt Power Supply			
Optional 350-Watt Power Supply			

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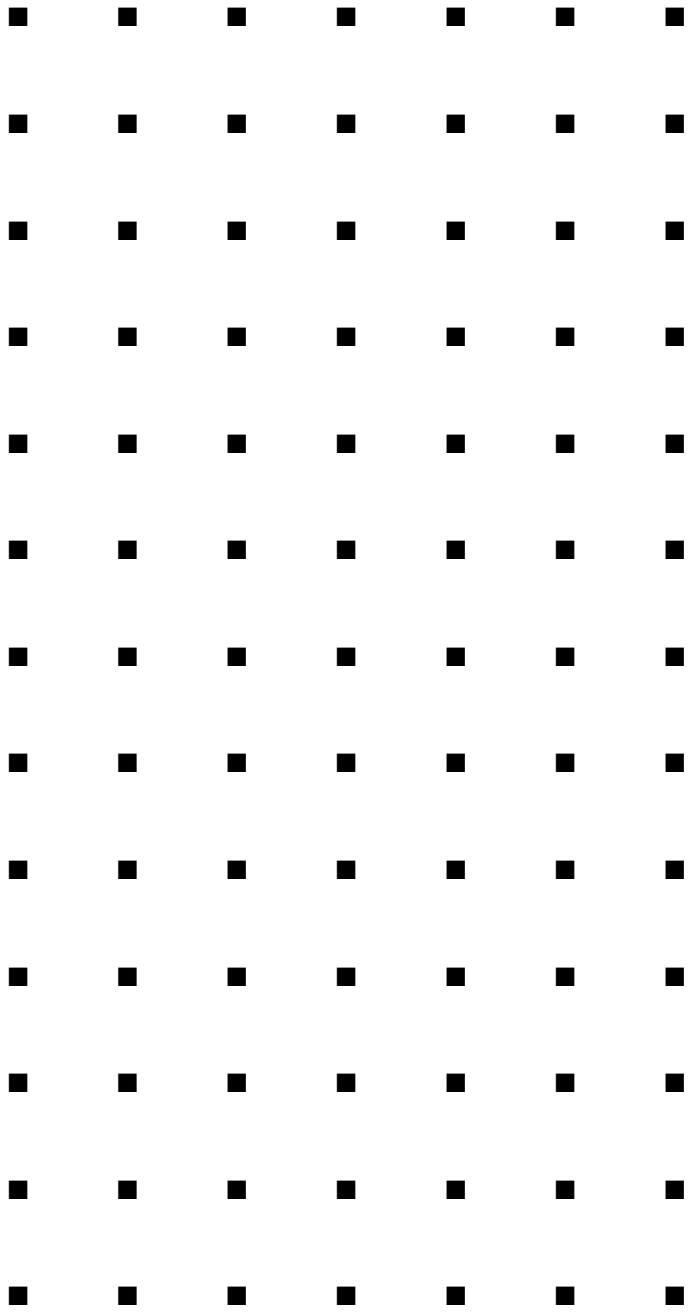

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